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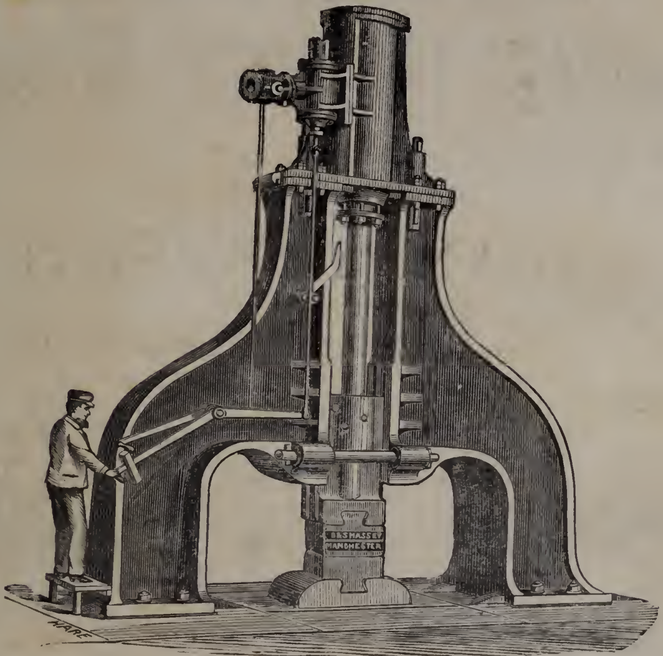

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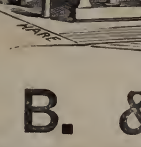

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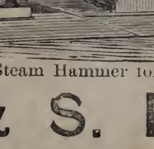

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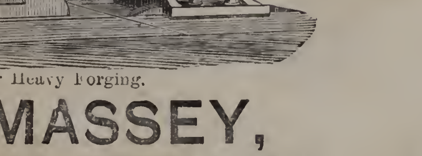

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Society for the Promotion of
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ARTISANS' REPORTS

UPON THE

VIENNA EXHIBITION.

— 1873 —

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The Object of the Society is the increase of the technical knowledge and skill of those engaged in the various Industries; the improvement and advancement of Manufactures and the Industrial Arts and Sciences, and the general progress, extension, and well-being of Industry and Trade.

INTRODUCTION.

BY a Resolution of the Council of the Society, passed at a meeting held on April 29, 1873, it was determined that a number of selected artisans engaged in the principal industries of the country should be sent out to visit and report upon the International Exhibition then about to be held at Vienna. It was also determined that in the selection of the Reporters, great care should be exercised, so that only those possessing the necessary experience, information, and intelligence, and a capability of observation, should be sent; and that men who had risen to be foremen, or to positions of trust, should be chosen rather than workmen of a lower grade. It was also decided, first, that every Reporter should be *bonâ fide* a workman, earning his living at his trade; second, that the applicants should be obtained by public advertisement; third, that every suitable candidate should give some practical proof of his fitness, before selection.

The number of applications received was 320. These were weeded down to about ninety by striking out all those who were evidently unsuitable, and to these ninety, after a personal interview, where possible, some test was applied. In this manner the best men were picked out, and the selection made.

In selecting the artisans to represent the various industries associated with Birmingham, Mr. W. C. Aitken rendered most zealous and efficient service. He entered *con amore* into the matter; and he has further, with much labour and trouble, superintended the editing of the Reports of the Birmingham men.

It was originally intended to have only seven of the Birmingham industries represented; but the Birmingham Chamber of Commerce having learnt what the Society proposed to do, with a generosity that does the members of it great credit, determined not only to take the burden of the cost of the seven men upon themselves, but to increase the number to eleven, which, through the liberality of some Birmingham firms became finally fifteen. This cordial and earnest co-operation of the Birmingham Chamber enabled the Society to enlarge the number of artizans it was originally intended to send to thirty-four.

The Sheffield Chamber of Commerce also contributed towards sending a representative of the staple industry of that city, and some of the watchmakers of Manchester subscribed together a portion of the expenses of a second reporter upon watchmaking. The Council are indebted to the kindness and liberality of Mr. Hugh Mason, the Chairman of the Council, for a loan of £200 to the Expense Fund of the Expedition; also, to several other gentlemen for donations of various amounts.

At a very early stage of the arrangements a telegram was received from Mr. Philip Cunliffe Owen, the Secretary of the Royal British Commission, at Vienna, to the following effect: "Obeying Prince's instructions, will do utmost to have the men shown carefully over the various parts of the Exhibition, and make their visit as instructive as possible." The kindness with which the men were received at Vienna, and the facilities that were given them to enable them to do their work as well as the short time of their stay permitted, was owing entirely to this expressed wish of His Royal Highness the Prince of Wales, President of the Commission, and the way in which those wishes were fully carried out by Mr. Owen. Great facilities in the matter of travelling, &c., were also afforded by the Commission, and in the forwarding of letters and telegrams from Vienna to England.

Mr. W. Mather, a member of Council, being in Vienna, was able to render great assistance in the preliminary arrangements, and he took much trouble to secure lodgings at a time when such accommodation was difficult to obtain, and the charges for it outrageously high.

The party left London on the 2nd July and reached Vienna on the 6th of the same month. Previous to departure every one had been presented with a copy of the Catalogue of the British Section by Her Majesty's Commissioners, through Messrs. J. M. Johnson and Sons, the official publishers, and by the kindness of Mr. Hossfield, of Liverpool, the publisher, with an admirable little guide to Vienna, with a French and German vocabulary, which was of great use and assistance.

Immediately on arrival the whole party were received by His Excellency Baron Schwartz Von Senborn, the Director of the Exhibition, who not only took a personal interest in the work of each reporter, but hospitably entertained them at a banquet in the Exhibition, and by both speech and deed showed his earnest sympathy with what he was kind enough to call "an industrial mission of goodwill from England to Austria."

Previous to the arrival of the men a committee of the English exhibitors and others had been formed for the purpose of rendering assistance in carrying out the object of the visit. On this Committee were, amongst others, the Rev. W. Rogers, Prebendaryof St. Paul's, London; Messrs. P. C. Owen, W.

Head (Ransome, Sims, and Head), S. R. Green (Green and Son), J. Berger Spence, H. Sandham, Pryce Jones,—Rutson, Lieut. Anstey, and Professor Archer (Edinburgh Museum).

Under the guidance of several of these gentlemen the first visit to the Exhibition was made, and the locations of the various exhibits pointed out, and much general information was obtained that was afterwards useful.

Subsequently a supper was given by some of these gentlemen, at which Mr. Head and Mr. S. R. Green presided. Both of these gentlemen, by the general kindly interest they took in the object of the visit, did much to render it a success. Mr. J. Berger Spence also liberally gave the men an opportunity of seeing one phase of Viennese life by inviting them to a supper at the "Fürst" Café on the Prater, at which the British cheers evoked by the playing of "God Save the Queen" by the band of the First Vienna Regiment will not be soon forgotten by the *habitués.*

In editing the Reports the greatest care has been taken to preserve the characteristic features of each one. All allusions to the outside proceedings at Vienna or elsewhere that did not bear directly on the work of the reporter, have been eliminated, as well as all mere descriptions of the Exhibition building. In some cases, the reports have been condensed, but with these exceptions, they are pretty much as they left the hands of the writers. The Council feel that the individual expressions and opinions of the men, whether right or wrong, are of more value left untouched, than if much altered in correction.

Among other instructions issued by the Council to the reporters, were the following:—

"The object in sending out selected and skilled workmen to report upon the Exhibition at Vienna is, that the artisans themselves may be benefited by the lessons such international displays are calculated to teach, and that through them, their respective trades may be stimulated to improvement.

"It is not intended in any way to fetter the Reporters with any instructions as to their method of reporting, but each one will confine himself to his particular industry. Their best discretion must be used, and attention may be profitably directed to the following points:—

"I. A comparison of the quality and character of the work exhibited by the different countries.

"II. The new features in old manufactures, machines, and processes, and the principal points in new ones.

"III. Relative cost of materials, wages, conditions of labour, &c.

"IV. Special features of National Exhibits."

The Reports are the work of English artisans, and as such must be read. In publishing them the Council venture to express their belief that they are no mean addition to industrial literature, and do no discredit to the intelligence and powers of observation of British workmen. Of the value of such Reports there can be no doubt; in addition to the value of the influence of them upon the writers, there is that wider influence that they must have upon their fellow workmen, and upon the manufacturer.

It is hoped that the former will learn from them the fact that intelligence, education, and technical skill does meet with reward, and that the latter will profit by the view of the industry with which he is connected as seen by the eyes of a practical observer.

There has been a greater delay in the publication of the Reports than was at first anticipated. It has been caused by many of them exceeding largely the length it was expected they would be, and the book has increased in size consequently from three hundred to five hundred pages.

Speaking personally I may be allowed to say that I have been much impressed by the very high order of intelligence displayed by the Reporters, and by the earnestness they showed when at Vienna, to do their work as well and as thoroughly as possible, in spite of many other attractions and the intense heat of the weather, the thermometer averaging 91° in the shade, and with few exceptions the work was manfully stuck to. Seven in the morning found most of them in the Exhibition, and the signal for closing only interrupted the work. The disagreeables incidental to a journey of a thousand miles from home and back, and to the mode of life of a strange land were borne with exemplary good temper and forbearance.

To myself the week spent in Vienna was a most anxious time, as I knew from official sources that from twenty to thirty deaths were occurring daily from cholera. With the exception of the slight illness of one or two of us, all were enabled to return to England in health. I cannot speak too highly of the readiness with which all the arrangements were acquiesced in, and the almost soldierly manner in which the necessary regulations were obeyed. And it is a great pleasure for me now to say, that a more upright, honourable set of men could not have been selected as the Artisan Reporters on the Vienna Exhibition of 1873.

WILLIAM GEORGE LARKINS,
Secretary.

Society for the Promotion of Scientific Industry,
Manchester, *November*, 1873.

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PART II.

(BIRMINGHAM ARTISANS' REPORTS.)

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Woodwork and Joinery.

By FREDERIC SMITH, *Manager, Union Land and Building Society, Manchester.*

In presenting my Report upon Woodwork and Joinery, I feel desirous of making a few preliminary remarks.

First, with regard to the Exhibition itself. Since my return I have often been asked what I thought of the great show at Vienna, and have been compelled to say that I scarcely saw it. Looking at the arrangement of the exhibits from a reporter's and workman's point of view, it has seemed to me that too much importance has been attached to the geographical position of the country supplying the article exhibited, and too little to the fact that, if a proper comparison is to be made, the productions compared should be—as far as possible—in juxtaposition. If the whole of the articles had been arranged according to material or class, the work of three days could easily have been accomplished in one, and comparisons could have been made with much greater ease and certainty. I am quite aware that, as a mere show, this arrangement would not have had the best effect ; but it is a matter for serious consideration whether it is not of infinitely more importance to institute perfect comparisons than merely to please the eye of the ordinary spectator. After working hard for nearly a week, I came away fearing that my work was imperfectly done, and that I had missed many things which I ought to have seen, and feeling that the time had been too short for justice to be done to the various subjects.

Next, with reference to the classification of my notes. For reasons which I shall state hereafter, I have placed first, and dwelt somewhat at length upon, wood-converting machinery. I have placed second, the ordinary tools of the carpenter and joiner ; third, buildings and house joinery ; fourth, cabinet-work and furniture generally ; fifth, machines made to any considerable extent of timber ; and sixth, timber itself. In the latter portion of my report I make some remarks upon the work I noticed in various cities and towns through which we passed, believing that it is in the streets and workshops that the truest exhibition of the average workman's skill is to be found, at any rate so far as my special branch is concerned. It is not my intention to make any special reference to design, except where I feel compelled in order to illustrate my opinions, as I have no desire to be caught poaching on the domains of my fellow-reporters.

With respect to the workmanship displayed in the construction of the various machines, I desire to express no opinion, leaving that to the reporters on machinery ; and I shall chiefly confine myself to the discussion of their adaptability to the various purposes for which they were made.

Holding strongly to the belief that in this age the nation whose machinery is most varied and perfect runs the least risk of being left behind in the race for commercial pre-eminence, and believing, also, that the measure of a nation's machinery either is or ought to be the measure of both the wealth and ease of its operative classes, I naturally turned with some anxiety to the English section in the Machinery Hall, and was agreeably surprised to find that, in spite of above a thousand miles of land carriage, our manufacturers stood foremost in the quantity of their exhibits.

When, after looking round, I discovered that, large as was the assortment of machines, they represented only a portion of those actually in use in this country, and supplied by the various firms who are exhibitors at Vienna, I felt that, so far at least as variety was concerned, we had nothing to fear from Continental nations, and that our only rivals were our Transatlantic cousins.

And here I desire to express the gratification I felt at the kindness and candour of the English-speaking portion of the exhibitors. Every machine was put in motion, and every specialty was pointed out to me, without the least hesitation ; an example which was not followed by some of the Continental exhibitors, one of whom even objected to my measuring the bed of a planing machine.

But some of the difficulties which I and others of my fellow-reporters met with were, I believe, simply owing to our inability to make ourselves understood. At the same time, I would suggest that, in future, it be made a condition that exhibitors allow measuring or sketching within reasonable limits ; for it appears to me that, if exhibitions mean anything, they mean an interchange of ideas.

WOOD-CONVERTING MACHINERY.

Worssam and Co., London, exhibit, among other things, an arrangement for giving the "drunken" motion required in a circular saw when used for grooving purposes, by means of one washer and a set screw, thus dispensing with the sets of bevelled washers commonly used; also a set of machinery for preparing parquetry flooring, including a disc for turning up the squares when glued together, and a table with verticle spindle, enabling two men to work at one pair of cutters; the timber is held firm on the table by an eccentric roller.

Messrs. Allen, Ransome and Co., London, among their machines, exhibit a hand mortising machine; and endless as is the variety of these machines, there have been improvements made in them of late. For instance, this firm lowers the table instead of the chisel, and if the screw and supports are only made strong enough, the advantage is great, inasmuch as it not only maintains the stroke at one uniform height, but the spindle carrying the chisel sliding in perfectly rigid bearings is an additional advantage.

Besides this, they seem, with other makers, to have discarded the spring stop of the reversing apparatus, and now this step is taken, the wonder seems to be that a spring should ever have been fixed for that purpose.

Personally, I should have preferred a longer stroke, and I find that the indiarubber washers are still in use, although I have seen that in a short time the oil reduces them to a pulp.

There are also some important improvements in planing machines, exhibited by this firm with some other makers. They have dispensed with the flange from the pulleys of the band saw, thereby greatly reducing the risk of breakage, and have applied to their pulleys a hinge bearing.

Charles Powis and Co. show a cheap and simple general joiner, one of the principal advantages of which is, that all the operations are performed from one shaft. They also show a planing machine, the spindle of which carries a flange for supporting the edge of the cutter, thereby imparting greater steadiness.

The pneumatic apparatus of Messrs. Allen, Ransome and Co. ought not to be forgotten. By means of this arrangement all dust and shavings are carried away, thereby promoting health and economy, and lessening the risk of fire.

Messrs. Robinson and Co., of Rochdale, have a number of machines, amongst them a dovetailing machine of a first-class character, a log frame calculated to run 300 revolutions per minute, and a cross cutting machine, having a chisel sharpened tooth. When we consider that this firm stands in the front rank in England as makers of wood-working machinery, and that the machines they exhibit in no sense represent the extent of their manufacture, but may be said to be a small selection from their stock, and that the same remark will apply to most of the other exhibitors, it will be understood that this Exhibition must not be taken as a test of England's strength in this direction.

The English makers seem generally to strive to obtain such a form of machine as will enable them to cast the frame in a single piece, and to secure solidity, accurate fitting, and—ugliness. The utilitarian character of the people is shown in their machines. The exhibits are precisely the same articles which will be sent from their workshops in the ordinary way of trade. The same everlasting lead colour, the same stiffness of outline, and also the same accuracy and strength.

AMERICAN SECTION.

In this section, considering the great distance the exhibitors have had to travel, the show is tolerably large, and the variety is considerable.

There are some very compact moulding machines by Rogers and Co., Norwich, Connecticut, some of the small ones at a very reasonable price.

A new machine to supersede dovetailing, by Knapp, of Northampton, Massachusetts, executes some very good though novel work, and its small size, and neat appearance, will commend it to the public.

J. A. Fay and Co., Cincinnati, show a tenoning machine with narrow frame, enabling the attendant to feed quite through the cutters without leaning over the table. Those who have worked a tenoning machine will appreciate this arrangement. There is also a beautiful machine for making buckets.

The general design and decoration of the American machines is superior to the English, though, for practical utility, they are no better, and in point of strength and solidity are scarcely so good.

FRENCH SECTION.

In the French section, F. Arbey, of Paris, exhibits a considerable number of machines, including a trying machine with spiral cutters, the sharpening of the cutters being accomplished by means of an emery disc travelling over them when in motion. I have been unable to see any advantage in this arrangement; for when we consider that the primary object of such a machine should be accurate work, and not simply clean work, and when we also bear in mind that a cutter for a 24-in. machine must be 28 in. to 30 in. long, the difficulty of securing an even temper over such a length of steel, and the impossibility of applying a straightedge to a spiral surface, makes me think that spiral cutters will never be very extensively used for trying up machines. Several other machines are shown by this maker, including several saw benches for manual power, very cheap, and some of them apparently well adapted for light work.

There are machines of various kinds from various countries, scattered up and down, but none of them, so far as I saw, calling for special remark.

JOINERS' TOOLS.

Heissinger, of Nurnberg, shows a case of joiners' tools in boxwood, and a cabinet-maker's bench. The case is a credit to him, both in design and execution. The tools, also, are well finished, but peculiar in shape; the handle at the front end of the planes would be puzzling to an English joiner. There are no hand saws, and the square blades are very narrow, which must make it easy to force them out of square.

Next is a case of tools from Leipsic. Here we see the marked difference between the English and the German tools. The bench planes are very narrow, the moulding planes are all worked upright instead of being sprung as ours are, the clumsy looking frame saw, and the variety of tools for doing the work which the English joiner would do with his plough alone, did not tend to impress me with a belief in the superiority of the German tools. The exhibitors of this case have had a medal from some exhibition, but most of the tools I saw an English workman would consider rude and obsolete. There are other cases of tools from Rhenish Prussia, many of them well finished, but the hand saws are conspicuous by their absence.

Of the English makers, Spear and Jackson, Ward and Payne, Kenyon and Co., and others, show joiners' tools, principally steel tools. The grinding of these tools is superior to anything of Continental manufacture. I could have wished that the show of planes and other wood tools had been larger.

BUILDINGS.

The buildings of the Exhibition itself and the annexes are, generally speaking, of good design, and the work is sufficiently well executed. The main buildings differ from those of previous exhibitions, in that they are lighted from the side and have a boarded roof; the inside was therefore cooler than it would have been had the roof been of glass. An additional advantage is, that there are no galleries, thus much labour is saved to the visitor. The roofs of the French annexe are formed of ribs of oak bolted together in segments, and strengthened by laminated ribs above and below, the whole retained in shape by forked tie rods and king bolts. The span is about 60 feet.

Some of the other annexes have what may be called hammer-beam roofs; but in consequence of the struts passing across the middle of the hammer beam, and straight up to the purlin, one fails to see what purpose the hammer beam serves, except to produce an optical illusion, and that illusion the worst which could be produced in a roof, namely, an appearance of deflection.

In the grounds is a Russian house and outbuildings, by G. Winterhalter, St. Petersburg, constructed of logs about 9 inches diameter, very neatly put together. Every possible portion is of timber, even to the cornices of the living rooms. The work is well done, but the ornaments are remarkable for being all angular.

There is a village composed of houses built in the styles adopted by the people of the various portions of the Austrian Empire, and a church with a groined roof supporting a bell turret, all of timber. The work is most of it ill executed, and contrasts unfavourably with the Russian specimen before-mentioned, and with a Swedish dairy, the work of which, as well as the selection of the timber, is exceedingly good.

House Joinery.

In this class of work, England and America show nothing, for the joinery of the workmen's cottages and the offices of the commission can scarcely be called exhibits. In these corrugated iron was the speciality, though, to my thinking, the visitors might inspect the sanitary arrangements, and be benefited thereby, for they are the only decent closets and lavatories I saw on the Continent.

Stroman and Larsomm, of Gothenburg, show some very good mouldings, and various kinds of joinery, well executed; but the panels are all jointed, and the wood badly matched in grain and colour. Other Gothenburg makers show a quantity of joiners' work, including splayed circular soffits for windows, not sufficiently well executed for England. There is also a spiral staircase from Stuttgart, with oak treads and risers; the design and proportion very good, but the rail, instead of being moulded from the solid, is in two thicknesses, screwed together from the under side; the joints are very bad, and the lower length is in three thicknesses, the top piece being about three inches long, and three-quarters of an inch thick, and of a different colour to the rest of the rail. I wonder how a workman, able to make the rail at all, failed to see the defects I have mentioned.

The pulpit by Goyers Brothers, of Louvain, is too well known to need either description or praise, and, after the specimens of bad work which I saw in Antwerp, I was ready to fancy that so much skill had been lavished on that pulpit, there was none to spare for the rest of Belgium.

I also found a spiral staircase, with risers, balusters, and rail in bent oak, an excellent illustration of the elasticity of the material, and of the skill of the workmen in bending timber; also a model of a spiral staircase from Brazil, with scarf-jointed rail, and I wondered why no English workman or firm had sent, at least, a model, to show how a butt-jointed rail could be made.

In venetian blinds, circular headed windows have generally been a difficulty. In one case this is obviated, by an arrangement like two fans, which close up the arch, and have a very neat appearance. In England, when the blind is drawn up, part of the light is blocked out, and the window practically shortened. In Vienna they often obviate this, by forming a box above the sash head, and drawing the blind into it, a great improvement upon our plan.

In parquetry flooring, England is a long way behind. Perhaps it is that our damp, cold climate causes us to prefer carpets; but, be the cause what it may, although there are many specimens of this class of work, I saw none but what were from Continental countries, some of them very elaborate and beautiful in design, and superior in execution: in fact, there was no class of exhibits which struck me as being so uniformly good. I am informed that most of the machinery which is made in England for this work is sent to the Continent. Some of the principal exhibitors are Carl Sterkel, of Ravensburg; Bauer and Rehorsh, Breslau and Berlin; Blumer, Strasburg, and Tasson, of Brussels. The Brussels flooring was specially excellent, and in these exhibits Belgium partly retrieves her character.

As in most Continental exhibits, the judicious choice of colour strikes the eye of the English visitor, as something to which he is not accustomed.

CABINET WORK.

Nothing struck me more in examining the German specimens of cabinet work than the wide difference in the quality of the workmanship. The designs were generally excellent; but taking two pianos placed almost side by side, in one, the joints were painfully apparent, while in the other, by F. Neumann, of Hamburg, the framing and cross-banding were perfect specimens of clean workmanship.

Another, in ebony, by a Berlin firm, was exceedingly chaste; the ornament was finished clean from the tool, while the rest of the work was all that could be desired. The same remark applies to the specimens of many other German exhibitors; but I noticed two wardrobes that were very inferior, and ought never to have found their way into the Exhibition.

An ebony cabinet, by a Dantzic firm, is very beautiful in design; the colour dead black; the curved mouldings and general finish reflecting great credit upon the workman.

Among English exhibitors, Messrs. Jackson and Graham, Holland and Sons, Walker and Sons, and others show specimens of the skill of the English workman. The two cabinets by the first named firm, executed from designs by Owen Jones, are perfect marvels of workmanship, both inside and out. The one in ebony and ivory is a masterpiece of cabinet work; the most rigid scrutiny on my part failed to expose a single flaw. The second firm show a splendid marquetry table, and the others have articles which fully maintain the honour of England.

The Italians show, from Milan and Florence, a quantity of furniture. From the former city comes a suite in mahogany and oak, beautiful in design, but wretched in execution; also an ebony and ivory cabinet, with lapis lazuli and jasper ornaments, very badly made; and if it could be placed beside that of Jackson and Graham, the contrast would be plain to the most superficial observer. There is also a marquetry cabinet from Carlsbad, full of work, but of a very inferior quality.

There seems to be very little ecclesiastical work in the Exhibition; the Belgian pulpit is the principal article in that branch of joinery.

Austria, and particularly Vienna, has a fine show in clock cases; oak and walnut are the principal materials; walnut seems to be an especial favourite with the Viennese workmen. The design and workmanship are generally excellent; in fact, the workman of the Austrian capital appears to be in advance of his Continental brethren.

MACHINE JOINERY.

In these days of iron there is little scope for the joiner in the frames of machines except in those for agricultural purposes, such as combined thrashing machines; and here Robey and Co. and Marshall and Co. vie with each other: the one exhibiting a frame in oak and pitch pine, and the other a similar frame in pitch pine and iron, both well made and deserving praise. Some

American machines with wood frames also took my attention; they were exceedingly well put together, as American machines almost always are.

And this leads me to ask how it is that the workmen of the United States are so far in advance of those of Sweden, Norway, Germany, and other countries? It cannot all be owing to the fact of their having abundance of timber, for in the countries I have named timber is plentiful. Is it not partly owing to the fact that very many of the best of the Continental workmen find a home in the States, coupled with the fact that when they reach America they are fettered by no such absurd restrictions as prevail in their native land, and are freed from the curse of enforced military service, and so hand down to their children the glorious heritage of unfettered intellect and unrestricted energies?

TIMBER.

There are some very fine specimens of timber shown in the Exhibition grounds, among which is a piece of straight ash, 93 ft. long, 2 ft. 8 in. at bottom, 1 ft. 4 in. at top; a beech, 80 ft. long, 3 ft. at bottom, 2 ft. 4 in. at top; and a splendid pine about 150 ft. long, 3 ft. at bottom, 11 in. at top. The timber most used in Vienna is oak and a species of spruce fir of two kinds—one resembling American spruce, and the other not unlike Norwegian red deal—neither of them very easy to work, and that makes me wonder that machinery is not more generally used. Much of the timber used in Vienna is rafted up the Danube, and the price of oak at the quay, when purchased in considerable quantities, was given me by Herr Paulick at about one gulden sixty kreutzers per cubic foot, or something like three shillings sterling. The timber used in Dresden is rafted down the Elbe in the same manner.

I visited the workshops of Herr Friedrich Paulick, and was received by that gentleman with the greatest kindness and cordiality. I spent some time with him in his office and workshops, and was struck with the good feeling which seemed to exist between himself and his workmen. He had some English machinery at work, but complained of the difficulty of getting his men to attend properly to it.

He mentioned that it was his custom to give to his oldest workmen—I mean by that those who had been longest in his employ—a periodical bonus over and above their wages, according to the amount of his profits. I saw there—what I am sorry to say I never saw in England—trees and flowers growing among the piles of timber, and looking in at the office and workshop windows, so that the workman could look out not at a brick wall but on a flower-bed.

In the construction of casements the Germans are in advance of us; but the great obstacle in the way of adopting their windows arises from our wet climate and the difficulty of keeping casements weather-tight. Double casements are almost universal, and in Vienna the outer pair are brought flush with the face of the wall; the result is that there is scarcely any shadow on the front of the building, and the architectural effect is seriously marred. At Aix-la-Chapelle I noticed many revolving shutters made to pull up with a strap; very well made, and apparently capable of pretty general application. At Antwerp the shop fronts strike one as very peculiar. Here also I noticed the custom which I have alluded to as prevalent in Vienna and elsewhere of bringing the doors and windows out to the front line of building, and consequently giving a flimsy and gingerbread appearance to the fronts of the houses and shops by destroying the shadows. This is the more remarkable in people who understand so well the shading of flat ornaments, and is almost unpardonable in the citizens of Antwerp, who have their beautiful cathedral constantly before their eyes; but when we see that they, along with the inhabitants of Aix-la-Chapelle and Prague, have striven to hide or disfigure the edifices which it should be their delight and pride to show to strangers, by surrounding them with cobblers' shops and *cafés*, one ceases to wonder at huge sheets of glass being brought out to the face of a wall, and I felt inclined to say, "We manage these things better in England."

The joinery of Antwerp is very indifferent. Nothing but the stump tenon and pin seems to find favour with the joiners of that city, a mode of construction which would not be allowed in this country. I saw some oak doors which were being fixed in a large shop in one of the main streets; the design was elaborate, the workmanship was simply abominable, and no respectable English builder would have allowed himself to be disgraced by sending it out of his workshop.

The conclusions I have come to as the result of my visit are, that while our workmen, and, indeed, many of our architects, are very far behind in art knowledge, and have very much to learn in design, especially where colour is made a predominating feature, we are as a nation greatly in advance in the quality of our workmanship. For, taking the exhibits in deal shown in the Exhibition, I do not hesitate to say that superior work can be found any day in the workshops of almost any building firm in England professing to do good work.

Again, the great difference in the quality of the exhibits, to which I have already referred, seems to indicate that the best specimens are the work of isolated individuals, and are not to be taken as criterions of the average skill of the districts from which they come.

They are more careful of human life in the erection of new buildings; at least, such was my impression on comparing their scaffolding with the flimsy erections we see in this country. It seems almost impossible to fall off a Continental scaffold, unless it is done on purpose, the scaffolds being formed of square timbers bolted together, with wide floors, strong and close balustrade, and are reached, not by ladders, but by flights of steps or inclined planes.

I could not help remarking on the journey that the amount of waste land to be seen is infinitesimally small as compared with England. Through Belgium, Prussia, and Austria they seem to know how to make the most of the land. Where they cannot grow corn they grow trees, and we find few immense commons in the very richest of their land, as with us. Near the stations and crossings, rows of fruit trees are planted along the sides of the railway, and in many places the turnpike roads are marked out for miles by lines of fruit trees. An example which might be followed with advantage in this country.

One great drawback to the development and progress of the Continental nations seems to be the military spirit which is fostered by the governments, and the waste and demoralisation consequent thereon. Vienna swarms with idle soldiers, while the women have to do the drudgery of the city. The waste of wealth caused by the withdrawal of millions of the people from productive industry, must be felt severely by the rest of the population, and the burden must be especially heavy on the poorest classes. Feeling this, I was not in a frame of mind to appreciate the exhibition of Krupp's guns, nor the armour plates of John Brown and Co., and felt saddened to think that, after the doctrine of peace on earth and goodwill to men had been preached for nearly nineteen centuries, the workmen of the most Christian countries in the world should excel in the production of machines for murdering each other.

We are often startled by the alarmist cry of foreign competition. If our workmen would only consider that every extra ear of corn grown, either in our own country or elsewhere, increases the general stock of food, that every extra article which is useful to man increases the stock available for human comfort, and that the mission of every new machine (if in proper hands) is to lessen the toil of the masses of humanity: instead of fearing the growing skill of their Continental brethren, they would leave off their drunkenness, become possessors of their own machines, train their minds and the minds of their children to a love of the beautiful and true in art and in nature, and bid Godspeed to all International Exhibitions, and to every means which good and thoughtful men adopt in order to bring men face to face in friendship.

We shall then not only cease to see women in Belgium harnessed with dogs and drawing carts; women in Prussia carrying hay out of the fields on their backs; women in Austria climbing scaffolds and working as platelayers barefooted; but we shall cease to see in our own country little boys and girls, who should be at school or at play, wearing out their young lives in our factories and workshops, nearly every corner in our cities occupied by a flaring liquor shop, our prisons and workhouses crowded, immense wealth and abject poverty elbowing each other, and every large town garrisoned by hundreds of men living in enforced idleness on the labour of their fellow citizens.

After visiting the hospital trains exhibited by Baron Munday, a man who deserves far more honour than a successful general, I came away deeply impressed with those lines of Longfellow,—

> " Were half the power that fills the world with terror,
> Were half the wealth bestowed on camps and courts,
> Given to redeem the human mind from error,
> There were no need of arsenals nor forts."

In concluding my report, I desire to say that if any special machine or work has been omitted it has been, not from my desire to leave it out, but from sheer inability to examine the whole of the articles in that immense Exhibition, in the time at my disposal.

Cutlery.

By JOHN WILSON (*Messrs. Joseph Rodgers and Sons*), *Sheffield.*

NEVER before the Exhibition of 1851 in London were the industrial products of all nations placed side by side for comparison. Since then there have been similar displays of rival skill. So far as regards cutlery, Sheffield at that time stood unrivalled; consequently, other nations could learn more from us than we could from them. In the London Exhibition of 1851 some of the cutlery displayed by Austria was of a very primitive type; knives without springs, which might have been made by a country blacksmith: the cutting tools were equally rude. Rhenish Prussia made a better display; their greatest defect was in the inferior finish of the blades. The French cutlers had a good display; common cutlery being represented by the manufacturers of Haute Marne. The finest French exhibits were from Paris. In surgical instruments, Charrière stood unrivalled. In sportsmen's knives, daggers, and cooks' knives, the Parisian manufacturers had a first-rate display. In 1862 things were in a similar condition. The South German Confederation showed signs of progress; if the quantity was less, the quality was improved. In the Exhibition of Paris in 1867 the French had a large display, as might be expected; every department was represented. Each country makes its most successful show at HOME. In the Vienna Exhibition Catalogue, "Metal Industry" is placed under "Group VII.," and includes articles varying in size from a small fish-hook or needle up to immense armour-plates, 18 inches thick. In Group XIV. there is also some cutlery, viz., surgical instruments.

The Exhibits of Different Countries.

Nearly every country displays some specimens of cutlery; nations cannot progress without cutting tools. For the purposes of a report on Scientific Industry, the production of these articles by many countries may be described in general terms. They neither supply their own wants nor enter into competition with other nations. Among these may be classed China, Japan, Turkey, Russia, India, Siam, and other countries. Most of these show plenty of raw produce and *special* branches of industry. Some of their exhibits of cutlery are more interesting to the antiquarian than to the modern workman. The tools of Japan, British India, and Turkey are very *rude*, yet still curious, so far as they show the attempts of nations to supply their industrial necessities. Some of the swords and daggers displayed by the nations above-mentioned are splendid specimens of ancient workmanship—handles studded with brilliants, the blades "Damascened" in various patterns. Whether these were made at Damascus (a place famed in past ages), or Toledo, or were fashioned by the sword cutlers of Liége, we are not informed. Be this as it may, the ancient metal-workers possessed great skill; but we have no means at present of ascertaining the cost at which these specimens were produced. Belgium, though manufacturing cheap pocket and table cutlery, is only poorly represented. Case 448 displays good swords, both in the blades and finish. Fonson and Sons need not be ashamed of their workmanship. The same remark will apply to A. Lambermont (Case 449), Brussels, and Case 282, exhibited by Bazet Brothers, of Liége. Russia has a much better display of sword cutlery and daggers than of other departments of cutting implements. Robert Bohte is the exhibitor. He has obtained medals at Moscow, 1865; Warsaw, 1867; Paris, 1867; Petersburg, 1870; and Moscow, 1872. Schaff Brothers, St. Petersburg, show a fine sword, inlaid with gold and ornamented with precious stones. Rhenish Prussia is represented in swords and bowie-knives by Fred Esser and Co., Haarhaus, Elberfeld. There is nothing special in this branch of industry from England or America.

In surgical instruments, Group XIV., several nations are represented. Peter Fischer, of Pesth, has a good display. The amputating knives look like English work. I. Mang, of Prague, shows a case of instruments, not equal to Fischer's. In the same court Dr. Schrotter and Henrich Reiner exhibit; some of their instruments are rather coarsely finished. The same remark will apply to Joseph Leiter, Vienna. Rudolf Thurrigl, Vienna, maker to the Austrian Government, displays *good* and *varied* instruments; and this remark will apply to J. Sobel, Gratz. In this department of cutlery none equal the celebrated successors of Charrière, No. 6, Rue de l'Ecole de Médecine, Paris.

Scythes and Sickles.

In this department of useful industry England is very badly represented. This is more surprising when we consider that these articles belong to the staple manufactures of the town of Sheffield. Robert Sorby and Sons could well have sustained our reputation. Robert Sorby was the first "Master Cutler," in 1624, and it would have been gratifying to me, as a Sheffielder, to have seen this old firm perpetuating its ancient fame. James Fussel and Sons, "Mell's Iron Works," near Frome, show a large case of scythes, sickles, hay and chaff knives, furze hooks, &c., all marked with their own name. Several firms in Westphalia exhibit in this class. There is nothing special to notice. The patterns are common to the Continent, and the description of the Austrian exhibits will apply to those shown from the North German Confederation. As far as numbers and variety are concerned, the Austrian display is immense. They are shown in various stages of manufacture, therefore a better opinion can be formed about them. The scythes vary in length from eighteen or twenty inches upwards to four feet, and some are about five inches broad at one end. In making both scythes and sickles the *hammer* is almost everything, the *grinding* nothing. The workman begins with a bar of steel, and beats it out apparently single-handed on the edge of his anvil. Many heats are required to do this. When the blade is sufficiently moulded (or, as we should say, *mooded*), the workman forms the tang. Then comes the *smithing* process, but this never removes the marks caused by the edges of the anvil. The blades are hammered very *thin*, and have a concave and a convex side. From their thinness they warp or "run" (as a Sheffield workman would say), in the process of hardening. In order to straighten them they are tempered very low, being subjected to heat until the colour of the steel becomes a dark blue, and then set with a hammer of a shape betwixt that of a saw-smith's and a grinder's "setting" hammer. In most cases the scythes' edges are drawn down the grindstone, and are then ready for use.

Many of the scythes and sickles are too *soft*, from being tempered so low, and it is probable that they use an inferior steel, because it can be worked at a higher heat than steel of a superior kind. This facilitates work, but deteriorates the article. A bad tool is *dear* to the workman, even if he can buy it at a low price. Mowing is never *easy* work. It is therefore more necessary for the worker to economise his strength. Ripe corn has brittle straw, and requires a good edge to cut it, on the same ground that it requires a good knife to make quill pens. The Austrian farmer has frequently to take his scythe from the handle to hammer its edge. For this purpose he has a small anvil with him in the fields; and the mowers may be often seen smithing the edges of their scythes and hooks, and afterwards whetting them with a stone or a strickle. The best Austrian scythes and sickles were from the Tyrol. The cases No. 130, 131, and 132 were without name. Each case had good narrow scythes, more like English patterns. Max Fasold (Tyrol, No. 133) and Franz Huber (Tyrol, No. 212) made the best display. The latter, I think, exhibited at Paris in 1867. Some of his scythes are cross-ground, and this is almost unique in German scythes. At Paris the best work in this branch of industry was shown by the Greenwood Scythe Company (America). For finish there is nothing equal to them shown at Vienna. For good material and workmanship the exhibits of James Fussell and Sons bear the palm in scythes, sickles, and hay-knives.

SAWS, FILES, AND EDGE TOOLS.

These articles have long been staple trades of Sheffield, and the town is represented by Messrs. Spear and Jackson, Ward and Payne, John Kenyon and Sons, and others. Taylor Brothers, Adelaide Works, exhibit a circular saw, 7 ft. 2 in. in diameter. It is described as best cast steel. The saw is perforated, hardened and tempered, and ground by patented machinery. The principle of the invention consists in the perforation of a number of holes under each tooth. Among the advantages claimed by the patentee are the following: "The teeth are more easily kept in proper shape, saving files, labour, expense, and vexation. The 'perforated' saws do not require gumming, and keep cooler at work than solid saws." This is a matter that must be settled by experience. It is questionable whether the "saving in files and labour" is not counterbalanced by the greater liability of the teeth to break, from being weakened by the perforations. Apart from any merits of the patent, Taylor's saw is a specimen of good work, and in 1851 it would have been deemed impossible to make a saw of that size. The etching on the sides is both *useful* and *ornamental*. By a series of letters and figures, a customer may order saws of any gauge, size, or form of tooth. From some cause or other, the saw is marked with rust, which detracts from its appearance.

The case of John Kenyon and Co. is near the last, and this old-established firm has an excellent assortment of saws, files, edge tools, and centre bits. Their circular saws vary from about one inch to five feet in diameter. Their tools are varied and well-finished. In files, the selection, if not large, is varied and excellent. This firm has long had an extensive Russian trade, the result of honourable trading. Next to Kenyons' case is that of

Ward and Payne's. They have a first-rate display of edge and joiners' tools. In carvers' tools they are remarkably strong. For neatness, variety, and finish, there is nothing equal to them in the Exhibition. This firm also displays a great variety of sheep shears, superior to anything of the kind shown by any other nation. In a report on the Paris Exhibition, 1867, written for the Society of Arts, London, I said, "It was a matter of regret to find one branch of trade in which we have almost a monopoly not represented, I allude to the 'wool shear trade.' It was almost a treat to see a pair of good sheep shears, and this was not confined to the British department; either Robert Sorby and Son or Lockwood Brothers could have creditably sustained the honour of Sheffield in this branch." At present the credit of the "City of Soot" is well upheld by Mr. David Ward, Robert Smith and Company, "Porter Works," and F. G. Pearson and Co., "Hope Works," who show varied tools from Sheffield. Some of Pearson's have a high polish, but have been damaged, either in transit or in the Exhibition. They are very creditable to this young firm. Wilson-Hawksworth, Ellison and Co., Sheffield, show files, steel wire, railway springs, hammers, &c. They show no edge tools; but I observed that the joiners' chisels, used by men working in the Exhibition, were stamped with their names. Near the above case is one of A. W. Wills, Birmingham, who displays hoes and picks, adzes, hatchets, hedging bills, and sappers' tools. A good case. There are other Sheffield firms who exhibit. Several of them confine their display to unwrought steel of all shapes and sizes, and some specialities of manufacture, as guns, rifle-barrels, steel shot, &c. Neither Cammell and Co. nor Thos. Firth and Son show edge tools, saws, or files, although both firms are extensive manufacturers of such articles. On the other hand, some firms show various goods not manufactured by them; for example, Schletter and Co., Birmingham, have an extensive case of general hardware, edge tools, brass ware, table and pocket cutlery, razors, and scissors, most of them with Sheffield names.

In the Rotunda there are two cases of this class of goods. The most prominent one is that of Spear and Jackson, Etna Works, Sheffield. The form of their cases is a parallelogram. On the front side, opposite the fountain, there is a magnificent lot of saws; in the centre a large cast-steel circular, 7 feet 3½ inches diameter; besides this there are other intermediate sizes down to one inch. They also exhibit one of Llewellyn's Patent Rotary Cutters, 14 inches diameter. The teeth of this tool are not punched out by the "fly," but files out alternately from side to side. It is well adapted for cutting fine work. On one side the large circular is a long 9½ feet mill saw, and a cross-cut the same size on the other. There are other mill, pit, and cross-cut saws of various sizes, styles, and shapes of teeth. In addition to these there is an assortment of hand and back saws, with polished plates and fancy handles. On the second side of the case are displayed cast-steel spades and forks, trenching tools, bills, reaping machine knives, hammers, spanners, &c. The third side has a good show of machine blades, spiral cutters for dressing cloth, and an excellent display of files in every variety. The fourth side is filled with edge tools, axes, adzes, chisels, &c. These are finished in the highest style. In fact, the same remark applies to the whole case.

Near the last case is one containing saws, steel (unwrought) and metal in various stages. The saws are less in size and variety than Spear and Jackson's, and contain no hand or back saws. They are marked "Forcersta Bruck. Fleming's Patent." I could discern no speciality in the patent. They are not equal to their neighbours. Austria is represented in this class by several exhibitors. The most notable, perhaps, is Franz Wertheim, who has a large and varied case. He has often contended with others, and has carried off twelve gold, eight silver, and four bronze medals. His exhibits are saws, joiners' and edge tools, chopping and mincing knives, pruning hooks, shears, a veneer saw in sections, and a number of narrow web saws, which are not surpassed. This exhibitor had a good show in Paris, 1867, and obtained a prize medal in London, 1851. They are good and useful tools.

John Weiss and Son (No. 417) show machine blades, chopping knives, planes, and edge tools. They have won thirty medals and five honorary distinctions. They show tool chests in great variety; a large and good collection. Antonio Benesch and Peter Brank exhibit various cutting implements: their drawing knives would be better if the handles had ferrules. H. Tyrolt, of Vienna, exhibits a few tools of a high character. Case 109, J. Braun and Sons, contains a large assortment of files, saws, machine knives, &c. The files are of all sizes, from one inch up to thirty-six inches. Some of the files had the end of the tang rounded, to do without hafts. This is not uncommon with German files. In the using, they cannot be held so firmly in the hand as a haft. The large half rounds were not well covered in cutting. An additional row of teeth would make them more serviceable. In rasps, single-cuts and large dead smooth files, none of the Continental makers equal the English.

W. Kranziger (Neuterchenfeld), has a show of files, principally half round rasps, and several steel discs, cut all over. They are intended to be worked by steam or water power.

Remscheid is well represented in files, centre bits, and other tools. A. Mannesman informs his customers that his files are "Hand Gehauen." He strikes his name and the words, "Guss Stahl." Some of his neighbours have both *hand and machine cut* files. They generally bear the maker's name and "cast-steel."

H. Wuster and Co. (Cronenberg) exhibit saws—circulars, long, hand, and web, in great variety. Files, well assorted. Chisels and plane-irons, highly polished. Skates and sheep shears; the latter not equal to Ward and Payne's; still Wuster and Co. need not be ashamed of their display. Robert Landon (Cronenberg) has a good lot of saws marked with his name. Edward Engels (Remscheid), along with his other exhibits, shows an immense variety of skates, both plain and ornamental.

Sweden and Norway, Cases Nos. 431 to 437, contain saws, tools, skates, and swords. There is no special merit in any of them. In this department of industry, it is a matter of regret that America is not better represented. The Douglas Axe Company have a good show of axes, adzes, and manchet knives. In the same court there was a good display of agricultural and sappers' tools; and at one end of the court there was a small case of joiners' planes. I have seen American tools in Sheffield equal to any in the world; it is, therefore, matter of regret that the United States did not appear in greater force at Vienna.

Before I conclude this subject it is only right to mention that Taylor Brothers, have done much to raise the saw manufacture in England from a simple handicraft. They were the first firm to introduce hydraulic pressure for flattening saws. They have also successfully applied patent machinery for grinding, glazing, and polishing long and short saws. Their corporate mark, "ADVANCE," seems indicative of progress. They have recently put down a machine that will grind circular saws of eight feet diameter.

FINE CUTLERY.

Under this term is included both pocket and table cutlery, razors, and scissors. In this branch of industry, America is also feebly represented. Peters Brothers, New York, show good tailors' shears, about thirty patterns of spring cutlery, and twenty-four patterns of scissors. They are useful, with no attempt at elaborate work. Landees, Fray, and Clark, New York, exhibit two pairs of carving knives, forks, and steels. A small lot, but really excellent.

France is not well represented. In first-class knives, the Parisian cutlers can make a good display. In London in 1851 and 1862, and in Paris in 1867, I had opportunities of seeing this. At the first named Exhibition, G. F. Picault got a Prize Medal, and richly deserved it. In the Paris Exhibition all the departments of the cutlery manufacture showed their productions. The late war has, no doubt, seriously interfered with French industry. In 1867, at Paris, Belgium showed some common cutlery at very low prices. At Vienna, I did not see any of this class. G. V. Helvestrand (Eskilstuna, Sweden) has a varied lot of razors, daggers, and desk knives. They are well finished, and have an English look. B. and O. Liberg have a good show of knives, scissors, garden and tailors' shears, and skates. There are several cases adjoining, without names or numbers. Rhenish Prussia is well represented in fine cutlery. Solingen and the neighbourhood have long been active seats of the cutlery trade. Since 1867, I think greater progress has been made in Southern than in Northern Germany. In the Report on the last Paris Exhibition, I said, "Two-ended knives are more general from Solingen than from any part of the Continent." This cannot be said now; such knives are common from all parts of Germany. Weydekamp, Kettling and Co., Iserlohn, besides heavy cutlery, exhibit scissors and penknives, mostly English patterns, among others the "Rifle knife." "Sunk joints" are less common than they were a few years ago. Fred. Blasburg, Solingen and Leipsic, has an interesting display. He shows table and pocket cutlery, scissors, shears, &c., and, in addition, he shows these articles in different stages of manufacture. The "fly" and "stamp" are both used at Iserlohn. P. Kamphaus, Solingen, shows tailors' shears and scissors, good finish. In the adjoining Case, B. Kissner, of Hesse, has a similar show. Near the last, Christian Marguardt, No. 85, exhibits knives in great variety, including hunting, sportsmen lock, sneck, pistol, and penknives. One knife contains 100, and another 83 different articles. These are a *good* lot.

Fred. Augt. Hermes, Solingen, shows varied cutlery, scissors, pen and bowie knives. In table knives the display is good. P. Engels, Solingen, shows pocket and table knives, erasers, *fine* scissors with pearl and ivory bows. His razors are chiefly "Rattler's." August Melchior has a small case of knives and scissors that are no disgrace to him or to Solingen. Carl Zimmerman exhibits button hooks, nail-files and corkscrews; in variety and finish they are inferior to the English. Joseph Mayer (Gorlitz) displays pruning shears and ordinary pocket-knives. His knife saws have the teeth double-cut, but too deep, and the edge *thicker* near the tang than at the point; this will make the saw bind when in use. The Austrian Empire has a large show of cutlery, and there is evidence of great improvement in its manufacture. Ignaz Rotschen, No. 351, exhibits a large assortment, including the Norfolk, Wharncliffe, and most of our best Sheffield patterns, in ivory, pearl and shell. He shows scissors and razors, and a set of dessert cutlery in fluted pearl handles. This is an excellent lot. No. 201, Carl Hentschall, has a card of small forgings. He shows scissors, &c., erasers, and desk knives. He also shows a gardener's knife, a "take-out" with six articles. This class has been a speciality with Saynor and Cook, Sheffield. No. 110 is without name, but, if small, it is a good case of hunting knives and fine scissors. In the adjoining cases, belonging to Franz Witck, Joseph Politsky, Rudolph Klock and Joseph Hejek, there is nothing special to notice; as a rule, they are not equal to some of their competitors. The goods of the last-named are marked "Tax," often struck after the knives are finished. This only shows that the blades are *soft*. In the next case, without a name, there are about twenty small shell sportsmen's knives. The maker need not blush for his fame.

Antonia Sladek, Vienna, shows a fair lot of daggers, sportsmen's knives, and the usual patterns of two, three, and four-blade knives. Joseph Grabherr exhibits knives, chiefly tortoiseshell sportsmen's, of the usual German pattern. A large and creditable lot. Franz L. Bihls shows scissors, daggers, table and cook knives, a lot of plain razors, principally "German Hollow," ground. Wengel Sedlack has a small case of fair articles; amongst others he has some good common "slotts." A knife, fork and spoon are very useful things. Ignaz Rosler, jun., Nixdorf, Bohemia, shows daggers, scissors and sportsmen's knives containing from six to twenty-five articles; small scissor-knives and "smokers' friends" in great variety. The goods are marked "I. R.," or the name in full, and sometimes "silver steel" or "cast steel." A few of his tailors' shears have a Sheffield look, the others are undoubtedly German. Side by side with the son's are exhibited the goods of Ignaz Rosler, sen. He has a large display, on the whole, perhaps, superior. The maker's name is stamped upon the blade. His pruning knives are not surpassed by any exhibitor in the German Empire. There are several exhibitors from Hanover, Hartz, Darmstadt, Holstein, &c. In general, the exhibits are of common construction.

F. Wellman, Altona, has one of the best displays of cutlery in the Exhibition. Before leaving home I had seen in a Sheffield newspaper a description of Wellman's cutlery "From our Special Correspondent." The notice rather disparaged his goods, and the writer displayed his ignorance by describing a "Picnic knife, containing knife, fork, spoon and corkscrew, evidently intended for a *one-handed* man." The "Nelson Knife" is for such persons. Wellman's knife was a "slott," which can be separated into *three* parts; but "Special Correspondents" often know little about what they write. I examined Wellman's goods very carefully, and showed him the description of his exhibits, and he said if I would give him the article, he would get it translated. Since I returned from Vienna I have learnt something of which I was then ignorant. The following account of these goods appeared in the *Sheffield Telegraph*, July 19, and it was written and sent from the Victoria Hotel, Dresden:—"Wellman's case and those adjoining are very creditable specimens of varied and *good* work. His hollow-ground razors, polished, are ground remarkably well, and on a less stone than any I have seen. The fault, if any, is the edge being too long." I personally examined various specimens of knives, scissors and razors, and am competent to judge of them better than those who only see goods in the case. Like all German cutlery, the defects are in the grinding. This is more especially seen in pruner shaped blades. The same thing is apparent in their scythes and sickles. I visited Wellman's case several times. On one occasion he told a German gentleman that Sheffield could not produce razors like his "German-hollow," and that he sent them to Sheffield. I am greatly obliged to this gentleman, who acted as interpreter for me. I was then in a position to deal with the subject. I told Wellman that he did not supply either Rodgers, Wolstenholm, or Butchers, and that he did not successfully compete with them in America. He said he did. My interpreter then asked me if I could show anything equal to Wellman's goods? Being thus challenged, I produced from my pocket a pearl-covered back four-bladed knife, and at once offered to show it against anything he had, offering at the same time to let the interpreter be the judge, when I had pointed out the defects in the grinding. This the gentleman and one of his friends (who spoke a little English) declared to be fair. I then asked the challenger to produce knives which I had examined the day before, and he refused to stand the test. My knife I afterwards presented, as a memento of Sheffield, to His Excellency Baron Schwartz. These remarks are not made to disparage Wellman's exhibits. Many of his articles are *first-rate.* Of his razors I must speak highly; in *grinding* they were superior to any German grinding I have ever seen. But the question may be asked, does Wellman manufacture at all? He offered to give £20 if I could produce a razor in the English department like his. I was not then in a position to comply. Now, circumstances are different, and I can produce the man who ground them, and the manufacturer who made them, with the Sheffield merchant through whom Wellman was supplied.*

In the English Department there are not many exhibitors of fine cutlery. There are several persons who show Sheffield cutlery with general hardware. London and Sheffield well represent England. Many people suppose that much *fine* cutlery is made in the Metropolis. "Town made" has often been struck in Sheffield for London shopkeepers. So far back as the year 1826, Messrs. Rodgers and Sons, Sansoms, Champion, and Thompson and Barber, made specimens of cutlery for presentation to the Royal Family. *The British Press* (London paper) says, "The specimens are certain proofs that the manufacturers of Sheffield have no occasion to be under any alarm that the London cutlers will long deprive them of their fair share of business, and that the quackery of marking 'London' on their knives will be of no avail when they are fairly brought into competition."

Amongst the London exhibitors John Neal shows "Pyro-Silver Cutlery." The articles make a good show. I cannot speak of the merits of pyro-silver, whether it is equal or superior to electro-plated ware. For my own use I should prefer knives plated on steel by the "soldering" process. Franz Pigall, London, has a good show of fine cutlery, and seemed to be doing a good business amongst his countrymen. He does not pretend to be the manufacturer of all the goods he shows. They are all marked with his name, which he says is a guarantee for excellence. He seemed to take a pride in allowing me to examine them. The carvers and forks were made for *use*, with good German slag hafts. If any of his cutlery is "Town-made," these are so. His spring-knives and razors were made in Sheffield, by Messrs. Wilson and Ibbotson, and, for a young firm, are very creditable. The ivory tang and pearl fluted razors were very fine. The scissors are of the manufacture of Wm. Gibbins and Sons. A large pair had the Austrian Arms filed out in the shanks. As a piece of artistic work in steel they are not equal to a pair exhibited by Morton, late MacDaniel and Co., who has a large and excellent case of pen and table knives, razors, scissors, dressing-cases, &c. His large scissors with the Royal Arms in fine filing are not, perhaps, equalled by any in the Exhibition. The form of our National Arms is better adapted for display in a pair of scissors than the arms of Austria. The scissors in this case, as well as much of the spring cutlery, are Gibbins's manufacture. The display of razors was excellent, including German hollow, flat tangs and rattlers. Mr. Richardson, in the first instance, claimed their goods as "London-made." As far as some of the table cutlery is concerned, I will not contest the point. As to some other things, I think, beside the firms already named, Messrs. Brookes and Crookes, and perhaps J. and W. Ragg, have contributed. Be this as it may, the whole lot is a creditable specimen of English workmanship.

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* I enclose my card to Mr. Larkins, impressed by my own hand with the mark "F. Wellman—ALTONA." The very brand which stamped his razors.

Sheffield is represented by the firm of Brookes and Crookes, and they worthily sustain the reputation of the place. The brief description in the Catalogue would not lead any one to suspect such a display. On the different sides of their case may be seen the Royal Arms of England and Austria, the Rose, Thistle and Shamrock, and other national emblems. By a good arrangement of various articles—razors, scissors, table, pen and pocket knives, and smaller articles for dressing-cases—a good display is made. This firm shows an assortment of all kinds of cutlery, many of them being made to exhibit. It will be invidious to particularise among so much excellence. A solid steel hunting knife was an excellent specimen of good work. It was straight, *sharp* and *clear;* a clearer piece of polished steel I never saw. It is seldom that large blades are so well hardened and tempered. A large ivory sportsman's knife, containing thirty-eight or forty articles, was a piece of good workmanship. All the joints were sunk, every article would "walk and talk," and, whether examined open or shut, the knife was a good specimen of Sheffield skill. The "smoker's friend" was here in several patterns. I made a careful examination of this case; and, as I sat wiping the knives and scissors, and opening and shutting articles which none but an expert could find, I was often surrounded by curious visitors, and sometimes by gentlemen with the word "Juror" on a large button. The best specimen of that useful knife, the "Wharncliffe," in the Exhibition, was in this case. It had shell scales and gold shield and studs. The knife had one small fault, the pocket blade slightly "rapped" on the spring in shutting. None but an experienced eye would have detected it. Notwithstanding this it was a beauty. The razors, both plain and ornamental, were good; and in dressing-case instruments they distanced all competitors. In scissors, also, they had a good display. In my opinion, Brookes and Crookes, for quantity and quality, including taste and utility, have the best show in the Exhibition. Their corporate mark, the bell, "bears the bell" at Vienna, as it did in Paris in 1867. Still, there was a great defect in the show of cutlery at Vienna. Scarcely one exhibitor had a good *cheap pocket knife*, such as would always be useful to the peasant of all nations, either to get his dinner, cut a stick, or, in fact, answer the purpose of a *tool*. I did not see one hollow-ground "sheepfoot" pocket knife. Knives for show are *fine*, and do to *admire;* but manufacturers should not forget that knives are made for USE.

THE PRESENT CONDITION OF THE TRADE.

The question may now be asked, What is the present condition of the cutlery manufacture? At the first great International Exhibition of 1851, the Jurors' Report on Cutlery and Edge-tools says :—"Among the seats of the cutlery manufacture there is none, as might naturally be expected, which for extent, variety and excellence, can compare with Sheffield, its most ancient home. We here find every article, from the most exquisite razor down to the plainest pocket knife, and from the finest saw or file to the most ordinary chisel, with various degrees of merit, it is true, but with a large proportion of excellence." I endorse this opinion *now*, as applied to razors, knives, and scissors. These branches of industry remain yet, almost entirely, "handicrafts;" and, notwithstanding what has been said about the extensive introduction of labour-saving machinery in America, and the cheap labour of the Continent, Sheffield will yet retain its position in this class. I expect the Germans still to progress. They begin to strike their own names on their best productions. I hope, for the honour of their national character, they will cease to strike the names and marks of others. Messrs. Joseph Rodgers and Sons, Sheffield, had recently a trial at law against a Solingen manufacturer for striking their mark; and, not long since, a large consignment of German cutlery, with the same name, was destroyed in London. It was seized by the authorities while being transshipped from one vessel to another, to be sent out as Sheffield cutlery. On my return from Vienna I bought a four-bladed knife in Dresden, marked in a *novel* manner. The side of the large blade was stamped, "The Real I.X.L. Knife." This mark was granted nearly fifty years ago by the Cutlers' Company, and is the property of George

Wolstenholm, Esq., Washington Works, Sheffield. The tang of the same blade was marked, "Rodgers, Cutlers to Her Majesty." Their corporate mark, a star and the Maltese cross, was granted in 1764. It need scarcely be said that the knife is *spurious,* and calculated to injure the reputation of the firms mentioned, who enjoy all over the world a deservedly great reputation.

The old branch of "Scythes and Sickles," it is probable, will not extend in this country; they will gradually be superseded by the reaping and mowing machines. The blades for these will yet be made in Sheffield. Since I wrote the part relating to German scythes, I have found that the Jurors' Report, 1851, confirms my opinion of their being *soft.* At page 487, they say, "There are from the southern provinces of Austria assortments of scythes worked thin, and with a concave surface, very difficult to forge, and therefore requiring much skill in the workmanship, but of metal so *soft* and *inferior* that they would not be considered worthy of notice were it not that they are made so purposely, to suit the peculiar habits of our agricultural population, who mow all crops, whether of grain or others, close to the soil, generally abounding in stones. A scythe of hard steel, with a fine edge, though it might perform its work better, where unimpeded, would be liable to constant injury and very difficult of repair under such circumstances. Whereas the Tyrolese or Styrian scythes, yield at once to the blows they receive upon their edge. The labourer carries with him a small hammer, and when the blade has so far lost its shape as to need renewal, he beats it out in a few moments to its original form; hence the softness in the metal, in most cases considered wholly inconsistent with excellence, in this branch of manufacture becomes an essential property." If all Germany was *stony* land, I could agree with this conclusion, but there are millions of acres of the finest corn land in the world. If the crops were mowed by piece-work, hard scythes would be used generally. If "*softness* is an essential property" in these articles, hardening and tempering may be dispensed with, cold "*smithing*" would give the requisite hardness.

The saw and edge tool trades in Sheffield have not increased with the growth of the population. In 1833 a Parliamentary Committee sat, to inquire into "Commerce, Manufactures and Shipping." Mr. Samuel Jackson (Spear and Jackson) was examined as a witness. In his evidence he admitted the superiority of Sheffield in making large saws. In the making of small web saws the Germans and French have cut us out of the market. In larger work it will be seen we still maintain our superiority. The opposition of the Trades' Unions to machinery has doubtless sent a portion of the saw trade to America and other places. So far back as 1842, the effect of the restrictive policy of the saw trade was seen by all intelligent persons who took an interest in trade questions. On the first of June in that year the saw trade memorialised the Board of Trade, "Praying for a duty to be placed on steel and *partly manufactured goods*" (pared saw plates). They stated that the exports of steel for saws averaged twenty-five tons weekly. This memorial was supported by the other Unions in the town. The Board of Trade replied, "That the remedy proposed would rather *restrict* than enlarge the trade."

In 1851 the manufacturers of Sheffield met those of France and Prussia at our International Exhibition. And with what result? The Jury shall speak for themselves. They say, speaking of the Sheffield exhibits, "From this collection the Jury have thought themselves justified in awarding, for one remarkable object, a 'Council Medal.' Messrs. Spear and Jackson have exhibited, among an assortment of edge tools of great excellence, a cast-steel circular saw, of the large size of five feet diameter, and of such signal beauty and perfection that it stands far *above comparison with any other* in the building." In the Paris Exhibition, 1855, the same firm maintained the position of Sheffield against all countries. The forebodings of Mr. Samuel Jackson were not realised. The firm carried off the Council Medal, and Mr. Samuel Jackson himself received the decoration and the title, "Chevalier of the Legion of Honour." And at Vienna they meet Wertheim, Weiss, Haas, Wuster, and others; and, in the words of the Jury of 1851, I will say of Jackson's circular, of the diameter of 7 feet 3½ inches, "that it stands for beauty and perfection far above anything in the Exhibition."

In the interval between one Exhibition and the other there has been a gradual introduction of machinery in the different branches of the saw trade, which has done much to supersede manual labour. All the saw grinders in the world could not grind saws like Taylor's and Spear and Jackson's circulars so well as the machine. In 1860 Wheatman and Smith, of Sheffield, put down a machine for grinding *long* saws. That was blown up, under the instigation of the Secretary of the Grinders' Union, and at the present time the man who did the "job" is grinding long saws by machinery on the opposite side of the river to Wheatman's Works. A wiser policy would have kept the trade at home. Restrictions have fostered rivals in America, where machinery is common, who are our most formidable competitors. Still, without a high protective duty in the States, I feel confident that Sheffield can maintain its ground, even in America.

This trade is not an expanding one, and though Sheffield may maintain its position against Continental workers, they will find greater difficulty with their American competitors.

The file trade is one of the largest and most important in Sheffield. In a paper read before the Social Science Association in Sheffield, 1865, by Dr. J. C. Hall, the numbers employed in the trade are as follows:—

Forgers and cutters	3,500
Grinders	250
Hardeners	200
Females	300
Boys	1,000
Dressers, Strippers, &c.	300
Managers	200

As to machinery, the trade is now in a state of transition. In point of utility, the forging machines are the most successful. The grinding machine is partially in use, though, I believe, not with the most economical results. Its indirect success will be in checking any exorbitant demands for higher wages. Cutting machines are used to some extent, but for real good work they are not equal to hand labour. The ultimate success or otherwise of machinery will depend on the economical results. If it can be successfully applied, the Unions cannot prevent the application. During the gathering of the Social Science Association in Sheffield, Professor Fawcett met the workmen in this trade on the question of machinery. The Secretary said, "that the trade did not oppose machinery. They only said, 'If the machine *begins* a file, let it *finish* it.'" In reply, Mr. Fawcett said, "Depend upon it, if by the application of machinery a file, or any part of it, can be made *better* or *cheaper* than by hand, then, sooner or later, the file *will be made*." For any machine to be successful in cutting files, the earnest co-operation of the skilled workman will be required, and, even with this, it is questionable whether files will ever be cut (simple as the operation appears) equal in quality to the best hand-cut work.

Watchmaking.

By J. S. TURNBULL, 27, *Corporation Street, Manchester.*

IN presenting this Report, I am afraid it will not be so lengthy and full of information as could be wished, for two reasons. First, the almost entire absence of English pocket watches in the Exhibition; there are only two or three exhibitors, showing but a few samples. I do not think there were one hundred English pocket watches exhibited in the whole Exhibition, and little if anything that was new among them. Second, in the French and Swiss departments, amongst the representatives of exhibitors, only a few could speak English, and I could only speak that language.

In looking round the exhibits of watch manufacturers I found that there are few attempts at reducing the cost of making up watches. The English watches shown in the Vienna Exhibition are, as far as workmanship, &c., is concerned, as near perfection as possible; but the price asked for such watches demands that it should be so: when £35 is asked for a plain full plate lever watch, it is only to be expected that it is the best production of skilled workmen.

What we want, in my opinion, and in the opinion of almost all the watchmakers I have come in contact with, is a watch capable of everyday wear, and keeping reasonably correct time, at a cost making it accessible to everybody. I know our watch manufacturers will say they do supply such a watch; but my experience is against that, for the middle priced English lever watch is no more to be depended upon than the same class of Swiss watches. A well finished and well cased silver lever cannot be sold at present under £8 to £10.

Now I should like to know why a good English watch cannot be made up as cheaply as the Swiss make their good watches. I think it could be done if our watchmakers, both men and masters, would allow their prejudices against foreign systems and ideas to be laid aside, and I think I see signs in the times that say those prejudices are being slowly but surely knocked on the head.

The first English exhibitor whose watches I looked at was C. J. Klafenberger, of London, whose watches have a high reputation in London. I may here at once say that I saw nothing new (in our trade) of any importance, or likely to effect any radical change in watchmaking, in the Exhibition.

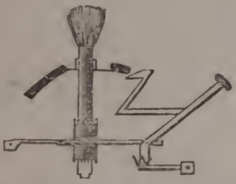
Mr. Klafenberger exhibits a few samples of London-made watches of very high finish; he shows a very beautiful chronograph, for which he claims a speciality in the stopwork; it marks seconds and fifths of seconds. He also shows some specimens of case decorating, a sort of enamel, but produced at half the cost of that material, while quite equal to it in all other respects.

I next looked at the case of Mr. Victor Kullberg, of London, who exhibits the finest lot of marine chronometers in the Exhibition. Anything superior to his work could scarcely be imagined. He claims to have constructed a balance that effectually counteracts the effects of temperature on the chronometer, either in moderate or the extremes of temperature. I was not fortunate enough to catch Mr. Kullberg, or his representative, at his case, so that I had to be content with seeing his things through the glass case. I cannot, therefore, very accurately describe his new balance, but it seems to me to be like two balances more than one, the under one like the ordinary flat steel one usually in verge watches, but made of brass and steel one above the other. On the top of that is a compensalia auxiliary. The mean rate of two of his chronometers for five months was within a fifth of a second per month.

French, of London, had a small case of pocket watches of the highest finish, finely cased and dialed. W. J. Thomas, London, shows a $\frac{3}{4}$ plate lever going barrel, with a back winder, very simple in construction, but I do not think it will be either useful or durable; the back of the case works on a shallow socket, having a fixed wheel on it, which works into a wheel fixed on the barrel arbor, into which the click works the same as a pendant winder, the watch being wound by the finger and thumb forming a friction plate, and turning the movable back round.

There was little more, if anything, in the English Section worth notice, save the marine chronometers, of which a goodly number was shown, and I can only say of them that, in that direction, England maintains an undoubted supremacy. I think if all the exhibitors of chronometers had shown certified tables of the rates of their exhibits, it would have enhanced very much the interest taken in them.

I will now pass to the Swiss Section. The first case of Swiss watches I examined was that of Badollet, of Geneva, a maker well known in England. The watches exhibited by this firm are something superb, not only in point of workmanship, but in the exquisite appearance of them; the engraving and chasing of their cases and dials are really specimens of high art. M. Badollet exhibits a keyless chronograph, with a new arrangement in the setting of the hands which is certainly a decided improvement on the ordinary thumb piece, which requires to be held in while the hands are being set. By his improvement he does away with that inconvenient necessity; the watch which he showed to me was a hunter; a small push piece near the figure V is pushed aside, which immediately throws the sliding wheel on the winding arbor into connection with the minute wheel, and holds it there until the hands are set, or the front cover of the case is shut, or the winding arbor is pushed in, the action of the snap spring, by a simple contrivance, withdrawing the sliding wheel from the motion work; a small lever with an inclined or angled face is, when the push piece is moved aside, sent under the nose of the snap spring, so that when the spring is pushed down, it presses on the angle of the lever and moves it back to its place. This, in my opinion, is indeed a real improvement.



The above is a rough sketch given me by M. Badollet's representative. It is not professedly accurate, but gives an idea of the invention.

The same maker also shows some very small watches, very good for showing what can be done by skilful workmen, but in my opinion also a great waste of valuable time in making such toys. Workmen who can do such work ought to have their time employed in making articles that will be of real practical use. Some of his cases serve to show that the Swiss fully understand *now* the value of having their movements well protected, and while they follow the English in weight of gold in their cases, they far excel them in the beauty of their design. M. Badollet's representative showed me a few which, in addition to being exquisitely engraved, had subjects splendidly cut out in relief, giving a really magnificent appearance to the case.

M. Louis Audemars, of Brassus, Canton de Vaud, Switzerland, exhibits one of the finest collections of pocket watches in the Exhibition; mostly complicated, such as clock watches, minute repeaters, calendars, &c. Pre-eminently among his exhibits is a watch he describes in his catalogue—"A clock watch, strikes hours and quarters in passing, minute repeater, independent seconds, one stopping for observations, marking simple and one-fifth of seconds on the same axis; two sets of hours on dial, full calendar and moon-phases, metallic thermometer, anchor escapement, compensated balance isochranal spiral, 45 rubies, treble keyless work, and double setting pin, 21 lines. System invented by Louis Andemars. The first watch, with all these complications, was manufactured by me in my workshops in the year 1867."

This is *par excellence* the most wonderful piece of mechanism in the Exhibition. Everything in and about it is finished to perfection. M. Andemars has certainly succeeded in cramming a greater amount of machinery into the smallest space than any man, either now or before him, ever succeeded in doing, and it does very great credit to both his genius and persevering industry. To give an idea of the complication of the watch, I would not undertake to merely clean it for a sum less than £5. The same maker also exhibits the smallest minute repeaters ever made, the movement being no larger than a shilling; his genius evidently lies in the direction of producing extraordinary complications. Among other firms who exhibited very high class watches were Patek, Philippe, and Co., H. Grande, Frean, and Co., &c.

There were a few exhibitors who showed watches of much lower quality than those of which I have been writing; but as they had no representatives, I could, of course, gain no information respecting them.

Before I have done with the Swiss Section, I would just mention that the dial makers of Geneva show some exceedingly fine specimens of their craft. Dial painting and elaborating seems to be made a study much more with them than with us. One dial in particular attracted my attention by its beauty, both in appearance, and as a piece of handicraft. The figures are plain black letters done in gold, and made to appear as if they stand up on their end, at an angle of 25 degrees; the shading, which is black, is so exquisitely executed that one sees at once that the painter of it was not only a splendid workman, but a true artist.

The first case I noticed in the French Section was that of "l'Ecole Nationale D'Horlogerie," which contains specimens of work of the pupils of that institution; all of which are the work of boys who had been there from twelve months to three years; all the escapements that are in general use, and many other peculiar escapements, on which a variety of balance springs were exhibited—the flat, the Brequet, the spiral, and one that was called a spherical balance spring, for which, however, no special advantage was claimed, except that it was good practice for the students, as it was considered more difficult to make than any other. The work showed no mean ability in the boys, and was a great credit both to them and the Institution. A ticket was attached to each, giving the name of the boy whose work it was, and the time he had been in the Institution.

There are here, as in the Swiss Section, a great many exhibitors of watches; but what I have said generally of the Swiss will apply equally to the French.

That the Swiss and French watchmakers are the superiors of the English in real delicacy and purity of finish in the design of the exterior of their watches, and in complications, is an almost universally admitted fact; for a long time that has been their characteristic, and it is so still.

English watchmakers have laboured hard to produce a machine that will measure time accurately; in that direction they have always carried the palm, *provided that they had a carte blanche as to price;* but the Swiss watchmakers, wise in their generation, have, without forfeiting any of their taste for a beautiful appearance, applied themselves of late years to produce a watch equal to our best English watches in point of timekeeping, and experience confirms the opinion that they have succeeded. One thing, in particular, is noticeable in the modern Swiss watch (especially with lever escapements): the shallow frail movements, which at one time were so extensively made up in the best Swiss watches, are being gradually discarded, and in their place is substituted a deep strong movement with a good deep going barrel, allowing of a broad elastic spring, which is everything in a going barrel watch. There is also a marked advance in their balances and balance springs. A good sized heavy rimmed balance and a Brequet spring is now found invariably in a good Swiss watch. The general result is that those watches keep as accurate time as the majority of English watches, and there are not a few in the trade who believe that these watches will be much more extensively used than they are at present, for the simple reason that they are much cheaper than English watches of the same quality; and protected, as they now are, by good strong cases, they are equally as well adapted for the pocket.

One sign of advance in our country is the disposition of manufacturers to discard the chain and fusee, and use the going barrel. I know it is still a controverted point as to the superiority of the going barrel over the fusee and chain. And the greatest argument in favour of it is the fact that our manufacturers are now making up going barrels much more extensively than they have hitherto done. At least ninety per cent. of the English keyless watches are made with the going barrel.

There is, however, a watch made up by Mr. Charles Wood, of Birmingham, called Powell's Patent Going Arbor, which is a great advance on either the fusee or going barrel. At least, that is the opinion of many eminent watchmakers. The advantages claimed for it by the inventor are—"Increased power to carry the escapement (lever) and govern the balance, which, in this watch, is larger and heavier than usual; the great capacity of the mainspring, which is attached to a patent traversing hook that advances and recedes with its action, which, combined with a large axis or arbor, renders accident almost impossible. When Mr. Wood allows his patent to run out, I believe this watch will be most extensively made up and sold. Experience proves that while its timekeeping qualities are equal to any fusee or going barrel watch, its liability to accident is 90 per cent. less.

Before concluding this Report, I would for a moment contrast the French and Swiss systems of training their apprentices with our English system.

The agitation which has been going on in this country for some time now in regard to Technical Education will, I hope, result in great good to our trade, for in no other trade in England is it more required; the ignorant state of a vast per-centage of our workmen in that direction is a most lamentable fact *and a disgrace.* When a youth is apprenticed in France or Switzerland he remains but a short time in the factory, some twelve months, more or less; he then attends such an institution as the one I have already spoken of, l'Ecole Nationale d'Horlogerie, where he has the benefit of lectures and classes, conducted by learned professors, and the teaching of practical men at the bench; here he remains from two to three years, when he again returns to the factory. Such a course as that cannot fail to make an intelligent youth master of his trade. How do we teach our youths their trade? How much do they learn during the first two years of their apprenticeship? In the majority of cases not much more than running errands and sweeping the floor of the workshop.

I hear employers complain again and again about the scarcity of good men. Why, is it to be wondered at ? They themselves will not be troubled with apprentices ; and small employers, who do take them, educate them generally after the manner referred to. I should like to see such institutions established in this country, supported partially by Government, and employers insisting that their apprentices attended such places. The benefit that would be derived from them would in a few years be simply inestimable, equally to employer and employed. I believe, and am fully convinced, that it would materially help to lessen the enormous importation of Swiss watches into this country. The very fact that the value of watches imported here during each of the first five months of this year exceeded £30,000, ought to stir the trade to do something to keep that money at home amongst ourselves, and I cannot see how else we can do it than by technically educating the mass of workmen, either by such institutions as these, or in some other effectual manner ; for though we have undeniably produced the greatest watchmakers that ever lived, the bulk of our present watchmakers are not equal as workmen to the bulk of the French or Swiss watchmakers.

Timekeepers, Clocks, Watches, and Chronometers.

By ALDRED M. RODGER, *Secretary to the Manchester District Watch and Clock Makers' Association.*

THE art of constructing machines for the measurement of time has frequently received very considerable attention from scientific men; and they are material aids, if they be not absolutely necessary, to the astronomer, the navigator, and the physician, as well as in regulating the concerns of everyday life.

Many great men like Newton and Ferguson, both Galileos, and both the Harrisons, with Dr. Hooke, have their names imperishably associated with the art of scientific timekeeping. The British, as well as several Continental Governments, Corporations, and many private individuals, have from time to time given rewards to foster the horological art; and doubtless a kindred spirit animated the Society for the Promotion of Scientific Industry in sending watchmakers to the Vienna Exhibition. As one of the number sent out by them, I will endeavour in this Paper to show the most recent improvements in the art, and also contrast the timekeeping machines exhibited there with those produced in this country.

The name chronometer is applied chiefly to those machines the principal use of which is to give correct time at sea, to enable the navigator to know his longitude; and in their construction an accurate knowledge of the expansion and contraction of metals in varying climates is absolutely necessary. The great difficulty of the chronometer-maker has hitherto been to construct a machine to keep correct time in changing states of the atmosphere in different parts of the world. This difficulty has been overcome chiefly by the combination of metals and the construction of the chronometer balance.

Mr. Victor Kullberg, of Liverpool Road, London, exhibits chronometers of the above description in a state of all but absolute perfection, both as regards workmanship and timekeeping. They are the perfection of mechanism, and do not vary in time half a second for many months. Among the many excellent horological machines exhibited, I saw none equal to these. Besides these, Mr. C. J. Klaftenberger, of Regent Street, London, exhibits chronometers, timepieces, and watches of very excellent construction, having all the modern improvements. His watch-cases are extremely chaste and beautiful; the enamelled work is done by a new and less costly process. Specimens of this are shown in the crests of the Archbishop of Canterbury and the Duke of Bedford, beautifully enamelled on bassine edged cases. In the French Department there was exhibited an excellent variety of clocks, watches, and timepieces of very superior quality, by different firms; Leroy and Brequet, both of Paris, stand conspicuous. The former shows timepieces with the duplex escapement, watches repeating the hours, chronographs with split seconds and duplicate dials, marking every division of time from a quarter of a second to the date of the month, and also the age of the moon, and all of first class quality. I cannot speak too highly of the timepieces exhibited by L. Brequet, of Paris, displaying as they do in their construction such originality of idea, versatility of talent, and superiority of workmanship combined, as I did not find under any other name in the Exhibition. 1st. An astronomical clock, striking the seconds at will, so that two or more persons can take observations at the same time. 2nd. A timepiece whose escapement is the vibration of a tuning fork, recording accurately the hundredth part of a second, which keeps correct time and is regulated by a screw on the tuning fork. 3rd. A regulator whose pendulum is of zinc and steel, that keeps time equal to one of steel and mercury, and is produced at a fraction of the cost. 4th. A timepiece whose lever action is on the right angle, enabling it to dispense with the objectionable contrate wheel, and bringing the balance into the horizontal position. And lastly, I will mention a remontoir clock, whose nine-inch-and-a-fraction pendulum shows seconds, and the workmanship of which throughout cannot be surpassed.

Such are some of the specimens of work exhibited by a man whose name is famous in the horological world as the inventor of the Brequet balance spring, named after him, and which is found so serviceable in giving isochronism when the cylindrical spring from its greater bulk cannot be used. In the French Department is also shown a large glass case fitted with model escapements, specimens of the workmanship of the youths in the Government School of Cluses. Here every escapement and every balance spring on a large size is exhibited going, the chronometer, duplex, lever, horizontal verge, vergule and others, with the cylindrical, spherical, Brequet, and flat balance springs attached, all produced by youths, from fourteen to twenty years of age, who stay about four years. Besides their trade, they are taught drawing, mathematics, geometry; in short, get a complete scientific and practical education. I asked the exhibitor what advantage there was in the spherical balance spring so generally used in the models; he replied, "None, but it was difficult to make properly;" it looked beautiful, and was regarded in the school as a test of proficiency in the art. Such schools must be very beneficial, and could our Government or some wealthy persons be induced to establish something of the kind in our own country, it would do much to bring back our art, and provide work for the unemployed of both sexes in a light and elegant business, the profits of which are lost to the nation, or nearly so. Our grandfathers supplied the world with English watches, and now we do not make half of those used in our own country. In the Swiss Department, as might be expected from the country that produces most watches, everything in watchwork is exhibited, from the smallest article separately to all the parts in combined action, as in the complicated calendar chronograph repeater.

In fact, in small complicated machinery the Swiss productions are unrivalled, and the house of Patek, Philippe, and Co. well represent their staple trade in this Exhibition. J. Huguenin Girard, of Geneva, exhibits a fine display of balance springs of all kinds; Bourgeaux and Delamure, of Geneva, a variety of excellent watchmakers' tools; and D. L. Petitpierre, from Couvet, Switzerland, shows a pitching tool with three sets of centres, and shows the pallet wheel and roller depths, in fact, the whole lever escapement is seen in it at the same time. This is a useful invention, and its advantage over the old tool, that can only show part of the escapement at once, cannot fail to be appreciated.

Austria and Germany generally are very fully represented in clocks in the Exhibition. The regulator and hall clocks made in Vienna, I examined in detail, and found them the best I had ever seen; the metal hard, the workmanship square, and the finish on the pinions, arbors, and pivots, when examined through the eyeglass, faultless; the jewelling finely executed, and the arrangement of the pallets for giving nicety of pitch, exquisite. Amid so much that is excellent in clockwork, I forbear giving names, as from my short visit I might omit some worthy of mention. I was especially indebted to Mr. Marenzeller, horologer, 21, Rothenthrum Strasse, for permitting his foreman, who speaks English, to show me through the Exhibition. The house clocks from the Black Forest and other parts in Germany, though in beautifully carved cases, have rather coarse movements, not to be confounded with those high-class timekeepers manufactured in Vienna. There are improvements in watchwork common to different makers, such as the lever watch on the double roller principle, which protects the watch, although the hands are set backward with some violence. I cannot state who was the first to apply this great improvement. Mr. Kullberg informs me he makes no other kind, and doubtless it will soon be universally adopted, and will contribute not a little to make the lever watch the best pocket timekeeper.

Another recent improvement in keyless work is the detaching of the pendant so that the watch cannot be affected in the pocket by being incidentally turned, whether it is on the fusee or going barrel principle. Chronographs, or watches that mark time in writing by means of a miniature pen on the point of seconds' hand, are shown in large numbers, and much improved. The principle can scarcely be called new; but how essential to record accurately the instant of passage of a satellite across the field of the telescope, or the decisive moment of a race!

In comparing the home and foreign work, for turret or large clocks, Great Britain stands first for quality and utility, and our system of manufacturing by steam power anything of bulk will always enable us to keep down in price where the orders are large enough to induce competition. Of hall or regulator clocks, Austria produces the best, and of spring clocks France has the best and most suitable for dining and drawing-rooms, or for mantel-timepieces. For chronometers, or lever watches, for timekeeping and quality, England is the first. For repeaters, or complicated watches requiring to give more than simply the time, Switzerland is unrivalled. Some of the Swiss keyless work is very simply got up, with small additional expense, having little more than an endless screw on the pendant; and for watches not expected to give the most correct time, but still that will go within one minute a month, the simplicity and cheapness of the going barrel, now universally adopted in Switzerland, enables her to produce a watch resembling the English make in strength more and more every year, and it will take the home trade all its time to hold its own on this class of work, except we adopt some better system in our manufacture. I fear our second-class trade, in which price is a consideration, will diminish.

The English watch cases are strongly made, but they are all alike or nearly so, with their everlasting engine turned backs, so unsightly after a few years' wear, while the Swiss cases are embellished with the art of the engraver in lines and curves of beautiful form and combination ; landscapes, animals, and vegetable life are subjects often represented, and form scenes the eye can dwell on with pleasure.

The enamelled work not only adds another beauty to the cases, but materially enhances their value. On the dome of a keyless watch I observed a beautifully enamelled miniature of a lady, which alone cost one thousand francs, or over £40.

I have thus given in the foregoing Paper, to the best of my ability, my opinions frankly, and I am grateful for having been afforded the opportunity of visiting the Vienna Exhibition of 1873. It has enlarged my experience, and I trust my report will prove interesting and of some utility.

Social and Working Habits and Customs of German Workmen.

By MALCOLM MACLEOD.

THE methods I adopted to obtain the information I required in writing this Report, were those of visiting, during working hours, two, three, or more workshops daily, spending evenings in the cafés and places of amusement, visiting the gardens frequented by the working classes and the houses mostly occupied by workmen's families; visiting with the utmost impartiality—just as opportunity offered—the church, the circus, the garret, the café, back slums, respectable residences, resorts of "life," &c. When I called at the workshops I took with me the reporter in *that* branch of trade. This served a double purpose; the reporter obtained information, and kept the employer or manager busy, whilst I saw the men in their normal conditions and received *their* version of wages, hours, work, &c., which I could afterwards compare with that given by the employers. Of course I should not have been able to accomplish much but for several gentlemen assisting me in getting through the workshops, and the valuable aid of an interpreter (lately a workman), kindly put at my disposal by the Secretary of the Royal British Commission.

WORK, WAGES, ETC.

The population of Vienna is set down at 1,000,000, the trades' population at 100,000, and the total number of workmen in Austria at 6,340,000. Of these there are miners 104,256, and employed in salt mines 12,771. I quite believe that the workmen are so situated as to become first-class at their trades. Their educational advantages are certain to be a power to them; they seem to be in education where we are in workmanship; in fact we need their school learning, they our workshop knowledge. The hours of labour are twelve for adults generally; agricultural labourers and farm servants often work fifteen hours per day, but there is no uniformity. Children seem to work from six to ten hours daily; Saturday, perhaps, one hour less in most trades; Sunday, sometimes till noon. I have seen Austrian workmen do excellent work, which could not be surpassed. But I feel certain they cannot in the same time produce work equal in quantity and quality to that of our workmen. They seem to lack the dash and continuity of our workpeople, so that this extra time is equal to an advance in their wages—as it is the total wages paid, and not the weekly wages, or hours worked, that determines the price of an article produced.

One million Germans have emigrated—mostly to the United States—from the Ports of Hamburg and Bremen during fifteen years; and during a two years' stay in America nothing to me seemed more remarkable than the sober, quiet, plodding industry of the frugal Germans, who command the average wages of the country. Whenever I found a number of men in Germany at outdoor work—excavating, for instance—at least one-half of the number were sure to be idling, talking, and smoking. They appear blessed with constitutions that can endure rest. But it is fair to say that the heat there was about 135° F. in the sun; still I think our navvies would either have worked or left it entirely. To me it looked slovenly that almost every man had in his mouth a large fancy pipe, the immense bowl reaching the lowest button on his vest. This long pipe and cigar smoking reminded me of the Yankee quack doctor's prescription, that "his medicine was to be taken internally, externally, and eternally;" for meet the Germans when and where you will, there is the inevitable smoke. I find no fault with the (eight feet) long handle of either the navvy's spade or pick, as it is just possible a man may do more work by stooping less. Certainly the men do not work out of doors as would be expected here. But I witnessed a great contrast when I visited some engineering establishments, and joinery and cabinet works, a large portmanteau, purse, &c., works, employing about 300 men, clock manufactories, and other places, and found the men (excepting one firm) working as constantly as would be the case in an English workshop.

The clock manufactory which I visited produced two kinds of clocks: the first is well known as the Viennese clock, prettily gotten up, the parts well chosen and fitted. These can be produced at a cost of about £2 5s., and sell here at about £5 each; our equivalent clock would cost about £6, and our clock-making operative earns less wages than his Viennese brother. Their turret clocks are not nearly so good as those of British make; the castings were, perhaps, better than the average Manchester work of that class, but not so good as those of Sheffield or Glasgow. The wheel patterns were not prepared with sufficient care, and the turning and fitting was not good.

The first cabinet-making works I visited produced a variety of work, the design of which was excellent; but though the intention of the designer was good, "distance lent enchantment to the view," of the inlaid work especially. At the second establishment (to which was added a builder's joinery works), whilst the design and taste of the work was equal to that at the first place, it was done in a far superior manner, and a practical English joiner accompanied and agreed with me that we could not surpass the work in England. In the method of doing the work, too, there were some things worth the knowing. But this is the province of my colleagues.

Nearly all the men at these two firms worked by the piece, and earned about one-third more than day wages. Both these firms have warehouses in London—proof of their ability to produce at a cheaper rate than we can. I also paid a visit to an establishment which manufactures every kind of fancy goods in leather from a purse to a portmanteau. About 300 men—also a few women—were employed there. The work is almost entirely done by the piece; the working hours are from 7 to 4 and 5 in the afternoon. The manager said the men earned about £2 per week, and were fortunate compared with other Viennese workmen. This establishment also had a place in London for the sale of their goods. I was very kindly taken over the extensive works and show-rooms of Messrs. Clayton and Shuttleworth (of Lincoln), where, except for the dress and some tools used, I should have noticed little difference between it and an English agricultural works. The men were steadily at work, and were nearly all on piecework, and earned about a third more than daily wages (the same class of mechanics work by the piece in England). All the plain and rough work was done in Vienna; but the best work, as the portable engines, and boilers, and the machine tools used, were brought from England. At the kind invitation of Mr. John Hardy, chief engineer at the Southern Railway works, I was shown every detail and given every information at these works. Mr. Hardy, being a native of Newcastle, was able to compare British work and workmen with the same in Germany. He complained that the German workmen (there were no Englishmen working here, nor at the other places visited) needed too much superintendence—could not be trusted to finish a job, as the British workmen could. To summarise, the information I received here—and I regard it as the most reliable I could obtain—Mr. Hardy taking all pains, and even looking up his Reports to his Directors to check my notes—there were about 950 men employed—400 on locomotives, the rest on waggon work, &c. They worked from 6 in the morning to 6 evening, 5 days; Saturday, till 5; and on Sunday did "odd jobbing" only. The artizans received, on the average, 3s. 2d. per day; the labourers 1s. 11d. per day. About 80 per cent. worked by the piece, and earned 5s. instead of 3s. 2d. Six years ago there was a Union, but, as usual with the German Unions, it was partly political, and, consequently, was suppressed by the police. There was a partial strike a year ago—the first one known at Vienna to Mr. Hardy: the men obtained the advantage, but new hands were taken on in lieu of the old ones who struck. The Union had no funds, but "levied" for strikes, and there is really no Trade Union now. He had no apprentices, as the term of probation was only two years. It is four to five in North Germany. But at other works apprentices were employed. Machine men, such as slotters, shopers, and drillers, receive the same wages as turners and fitters. The men work as many machines as they can tend at one time. All Austrian workmen could read. Bohemians were good at hard, but not at intricate, work, excepting those who had come to Austria when young, and who could now do the best work with despatch. Men staying off work through drink was a rare occurrence indeed. The wages of some classes of men in the country were 10 per cent. less than in Vienna. But the countrymen had more comforts and were best off. The wages already cited were an advance of 25 per cent. on those of fifteen months ago. It is worth noting that while I was at the Southern Railway works, no idling, smoking, or drinking could be seen among the 950 workmen.

Haswell and Sons employ 1,100 men, very few of whom were smoking. Both these firms were engaged on locomotives and other railway work, both were in Vienna, and both under English management. But when the works of Messrs. Sigls were visited, many men had their beer before them, a large number were smoking cigars or pipes, and standing in groups, seemingly as indifferent to the promenade of the foreman as were the two crouching dogs that had just run in with a new supply of beer in the barrels on their cart, and the girl in attendance seemed fully employed "refreshing" the men with frequent draughts. This firm was under German direction absolutely; 1,500 men were employed on locomotives and general machinery.

At Haswell and Sons' ordinary mechanics earned 5s., others, as erecters, earned about 7s. per day; whilst at the Southern

Railway works the men were employed at repairs. Messrs. Sigls were employed on new work built by contract, and therefore subject to competition. It will be noted, too, that there is a great difference in the wages paid at these establishments.

All the workshops I visited were clean, comfortable, and fairly healthy ; the men, too, seemed cleanly, clad in plain, serviceable clothing. Many of them worked with bare feet in the joinery works.

Considering their economical manner of living, their inexpensive enjoyments, and the progress these men are rapidly making in most branches of industry, they are not rivals that we can afford to despise. They have a broad margin for improvement. We have small growing space beyond improving upon ourselves.

Brunn, a manufacturing town, furnishes another sample of life. Here, as at Vienna, there are no beggars, or "miserably poor :" the people are largely employed at the woollen mills, the girls earning about 5s. 6d. per week—*three* girls doing ten per cent. more than *two* girls would do in England ; but they work 72 hours per week, as do the men, who earn 10s. to 14s. per week. The English overlooker (as a teacher of Germans), who would earn about 30s. in England, receives at Brunn about £4; but very few of such men are retained. No work is done on Sunday except by the clerks and warehousemen, and "odd jobbing."

The people here and at most other towns and places are crowded together to sleep, irrespective of age or sex, as many as can be got into one room. The number of persons in one room is limited to the space required for them to sleep in. Illegitimacy and concubinage is common to all classes. The wages are stated officially to be, throughout Austria—Engineers and mechanics, cabinet-makers and joiners, 26s. to 28s. ; labourers, 10s. ; plumbers, 16s. ; silversmiths, 12s. to 14s. per week; and joiners, 5s. ; tailors, 4s. to 6s. ; smiths, 4s. to 6s. ; builders' tradesmen, 2s. 8d. ; labourers, 1s. 8d. per day ; agricultural labourers, £5 per annum, with board, lodging, &c. ; Vienna upholsterers, 20s. per week. Hours in most trades about 60 to 65 per week. These rates do not include board, lodgings, and other conveniences, except to the agricultural labourers, and which must always be regarded as so much wages. There are 76 whole holidays in the year.

WOMEN'S WORK.

Work usually done in England by bricklayers' labourers is performed throughout Germany mainly by the women, whose dress is one remove from Mother Eve's before the fall, and though very economical and convenient, it would be here regarded as indecent. These women mix the mortar, carry the bricks, lift the stones, and attend generally upon the men. They had also been taught to solicit "allowance," though they were wise not to spend the money in drink. Water in Vienna is obtained by means of large pumps, stationed at short distances from each other. The pumping for town purposes is done after the fashion of a clock pendulum. Two women, sometimes three, are to be found working at each of these pumps. One may see occasionally a man, apparently an overlooker, making a desperate attempt to post himself against the wall surrounding the pump; but I never saw a man pumping.

Street cleansing is mostly done by women, but sometimes men work with them. I noticed women working as navvies in excavating foundations; they took the shovel or the barrow, as the case was; so it was with the women plate-laying on the railway. But I marvelled that, whilst nearly all the men had shoes, the women usually had none. Besides the work named, I witnessed several women working at mowing, ploughing, and general farm-work, drawing a cart with the aid of a dog, taking care of railway crossings, working as porters, carrying loads (in criels strapped to their back), and as gardeners.

These labouring women are mostly Bohemians. The Bohemians, men and women, seem to do the hard work in Vienna. Evidently a different construction is put upon "Woman's Rights" there from that understood in England. In Germany woman's right to labour seems to be universally recognised, and so far respected that no man is so ungallant as to limit that right by helping her. Since women are allowed the full "dignity of labour," I fail to see why they should not be allowed to win "honour and glory" in the army and navy.

I was inclined to be hard on our Cousin German for thus degrading women by physical labour, but I passed a brickworks at home since I penned the above, and I have not decided which is worse for a woman, to *make* bricks, or *carry* them when made. I would say hard things of the Austrians for allowing women to sweep their streets, but fear Austrians may hear that our women work in coal pits.

Much of the portering, such as we see done at home with donkey and cart, is commonly done with dog and cart, driven and drawn by women. The loads these dogs draw are surprising. There are often two dogs to the cart, or a woman takes the place of the second dog at one side of the shaft, and runs along with the cart. I observed less of this means of conveyance in Vienna than in Dresden and Aix-la-Chapelle. Churches are seemingly open at all times of the day, where the very poor and women were the most noticeable at devotions. There were some honest wives who economised their time by calling at church on their way home from their marketing ; but at any time I could have found more persons at any *one* of the many hundred cafés than could be found inside a church. But I think there are few ribs broken in hasty attempts at getting into church ; I always found ample room there, whilst I could not always obtain a seat in a café. The market women, with their criels strapped on their backs, and in the quaint country market attire, called at church for devotion as they returned home.

Sunday.

As we both arrived at and departed from Vienna on a Sunday, I was struck by the contrast to an English (and especially a Scotch or New England) Sunday. At 6 in the morning people are breakfasting in the saloons, some going to work until 12 ; shops open; persons buying and selling; girls or women working at the town pumps; dredging boats at work on the river ; Turks squatted on the road-side smoking; steam-boats filled with pleasure parties scudding up and down the river; women shaking beds, and thoughtfully placing them at the open windows to sweeten ; a quaint brewer's cart laden with barrels ; builders' carts laden with stones, sand, &c. In fact, Vienna is as busy and as lively at 6 o'clock on a Sunday morning as Manchester would be on a week-day at 8 or 9 o'clock, even to the gentry driving out in carriages, and all the etceteras of everyday life. There is some work done in the workshops on Sunday, but it is scarcely the rule, and when work is done on Sunday, it is only till noon, and is optional with the men. The Viennese people have the like aversion to working on Sunday that our people have to working on Saturday afternoon, and have much the same reason—pleasure. But it seems a recognised rule to do "odd jobs," or "work if you like." "Six days shalt thou labour, and on the seventh do odd jobs," that is, if you can deny yourself the gardens, café, &c., is the creed.

Trade Unions.

There seems to be little of the kind of Trade Associations known as "Unions." Those which have existed seem to have languished; hence we find no uniform rate of wages, hours, or trade customs. The existence of Courts of Arbitration, however, prove that there must be some matters of difference to settle.

Strikes often terminate by the men carrying on business in their own trade by means of co-operation. This applies with greater force to North Germany, where the workpeople are better educated than in the South. There are Travelling Unions, which assist the members by way of a bed and breakfast in each town.

Cost of Living.

Clothing of the same kind and quality is not much less than in England; but although the Germans usually dress well on Sundays and holiday times, they do not regularly wear expensive clothing.

It is not often in Vienna—but quite common out of it—that the employers supply dinners for the workpeople; and it is officially stated that 46,739, or 13·7 per cent. of the entire working population are thus wholly or partially provided with board. Some employers furnish provisions at the market prices; others have cheap eating-houses or cafés on their estates; and patches of ground are allotted out to the workpeople. Some trades, as joiners, are furnished with tools, which are considered in the wages. Trade, like Government, in Germany, is more paternal than independent.

It is estimated that the cost of a single man's living for one year is—board, £36 10s.; lodgings, £10; clothing, £6 14s. Out of the large towns these expenses are less. Dr. Engle estimates that the cost of food absorbs 62 per cent. of an annual income of £45 to £60. In such cases lodgings cost about 12 per cent. But I regard these estimates as extremely liberal. It must be understood that the food is not such as would satisfy the British workman, whom I hope never to see content with the house accommodation of Vienna.

The wines and beer commonly drunk in Germany contain very little alcohol, so people drink an immense quantity and do not become intoxicated. Drinking is mostly done at eating times; stronger drinks, as brandy, whiskey, and British beer, are seldom indulged in. Austrians will often sit in a café and drink only about two glasses of these weak drinks. With them it is more a matter of making a meal, or listening to music, than mere drinking.

I think I saw not more than one person intoxicated, and he was an Englishman, and had been taking stronger drink than is usually taken by natives. Some half-dozen of our party compared notes on this head, and their experience was like my own.

All classes, all sexes, all ages frequent the cafés. Classes predominate just in proportion to the locality, whether near to the domicile of the worker or the wealthy. But all classes commingle together. In any of these cafés you may find gentlemen and working men with their families, taking their meals according to the length of their purse. It is not easy to distinguish between the rich and the poor in this respect at evening meals. At some of these gardens, in other ways very pleasant as a summer retreat, and as a place for "restoring man," bands of music are often in attendance, and play some really good music.

These cafés have gardens or spaces of ground planted with trees, or if fronting the road the space may be made into an impromptu garden by the aid of huge tree-pots, which succour trees that serve as some shade and retirement; but there are a few at which the chairs and tables are in the street. People take their meals in this fashion; but passers-by do not take the slightest notice; everybody seems to mind his own business in Germany.

I may simply mention the dancing of the voluptuous Can-Can, as performed in Vienna. I have no sympathy with milksopism; still I regard this exhibition as simply disgraceful. But it is proper to state that the admission is about the amount an artisan earns per day, and other expenses are in proportion, so it will be seen that this is not a workman's amusement.

The Germans are very fond of, and will have, good music; their circus and cafés present splendid displays, and close at the time such places fairly commence in London, about half-past nine.

HOMES.

There is no dearer word in the Anglo-Saxon tongue than home. If the British workman has a home, with all its tender associations, its humble but ennobling and refreshing comforts, with what inspiration can he face the world! The thought of home lightens the toil of the labourer, cheers him on his way, giving tranquillity to body and mind. Yet I am told there is no word in the German language that expresses the word "home." I fear they have little use for the word. Feeding at the café and sleeping at the lodgments would be a poor substitute for our English home. One finds at the entrance to what are, externally, handsome mansions, the wives and children of the apparently poor. It is their domicile or lodging-house. All the rooms, landings, stairs, &c., are wonderfully clean, and this under unfavourable circumstances, as the rooms are let off to so many families. The common entrance to all is through a hallway, the keeper of which requires a penny from every person admitted after 10 at night until 4 next morning; at which hour almost everybody is on the move, especially the women, who will be found doing all kinds of domestic duty soon after that hour. I was told by an Englishman who took me to his lodgment (a very comfortable, clean, and respectable looking apartment) that 300 persons lived in "that house," which seemed a fair sample of "lodgments" generally in Vienna. If you are asked to sup with a friend, or dine, or take tea with him, you meet him at a café for the purpose—home, or "lodgment," is never dreamt of. The workmen's apartments and surroundings are certainly not what would suit a British workman, neither are the internal fittings or the conveniences such as would please our tidy housewives, to say nothing of having to fetch the water from the public well, often a great distance from the house.

In many districts the dwellings are built by the owners of factories or mines, just as is done in all new industrial countries (it is so in America). These dwellings are frequently purchased by the working men out of wages that would be regarded as extremely low in England, many Englishmen spending more on themselves than these men earn. About 60,000 are furnished with lodgings by their employers. In Vienna the large buildings, or lodgments, present the appearance of gentlemen's mansions, with hall entrances, and a gateway opening into a large square court-yard formed of four extremely large buildings, two or more of which may have their entrances from the said court-yard. In this way it will be seen that the land is more closely built upon than it could be on any other plan. Indeed, the consideration seems to be, firstly, how many lodgments can be built upon the least space? secondly, how many persons can be lodged in each room? Yet I daresay the people are very much astonished at the sudden appearance of cholera and other epidemics. I wonder that these places are not constantly afflicted with such diseases.

EDUCATION, CO-OPERATION, ETC.

From the Consular Reports received by our Foreign Office, we learn that there are "many excellent trade schools" and "drawing and Sunday-schools are provided by some mine proprietors." The law (1809) makes attendance at school (from the ages of 6 to 12 years) compulsory, and even for a longer term, if needful. The religion taught is according to the parents' choice, or the creed in which the child is born. The religious teaching is during stated hours, from 8 to 9 o'clock in the morning, twice a week, and the child may be absent, at will, from such religious instructions. Before the above law was passed the cost of educating a child was 2d. to 3d. per week. The new law has done very much good, and though evaded sometimes, it is generally well observed; and the officers enforce the law strictly and the people regard it with much favour. But education must have been highly appreciated before this law was passed, as a totally uneducated Austrian is rare. At the museum I found young men engaged in moulding in plaster, works of art, which are sold.

The Working Man's Education Union in Vienna is doing a most important work, and the association is duly appreciated as proved by its membership, numbering 8,000, out of a trades' population of 100,000. Besides some dozen academies and seminaries, of a very high class, there are in Vienna alone about 20 classical high schools, 115 industrial schools, 90 public, grammar, and national schools, and 300 private educational establishments.

The progress of co-operation, and that too in the higher and more difficult branches in which it has been found almost impossible until recently to make any progress in this country, proves the Germans to have both intelligence and education, and serves as an exhibit of their self-denial, prudence, and power of organisation. The following will show the great progress of the Co-operative Banks in North and South Germany during eleven years :—In 1859 there were 80 societies with 18,676 members, who had money on loan = 4,131,436 thalers; share capital, 246,001 thalers; and in 1870 these figures had risen to 740 societies, 314,656 members, 207,618,287 thalers lent; and the share capital had risen to 13,449,152 thalers (a thaler is equal to 3s.). Even during the Franco-German War the number of co-operative banks increased by 121, and 112 new stores were opened, while 9 manufacturing societies were established. The business done by all these societies in 1870 amounted to 350,000,000 of thalers. The paid-up capital was 27,000,000, and the loan capital 62,000,000. The number of co-operators now in Germany exceeds 1,000,000. Amongst the "Magazine Associations," there are of shoemakers, 65; agriculturists, 43; tailors, 37; cabinet-makers, 24; smiths, 8; weavers, 5; bookbinders, 4; glove manufacturers, 2; carpenters, 2; basket-makers, 2; house-painters, 1; millers, 1; cloth-makers, 1;

sewing machinists, 2 ; booking establishments, 1 ; house-building establishments, 5 ; and they appear to make most progress in co-operation just where we make least.

SOCIAL MATTERS.

The German workman is a plain polite man, whether in his blue blouse or evening attire ; he will raise his hat to whoever he meets, no matter if they be below or above him in social position, and I observed more familiarity between the employer and the *employé* than is usually the case with us. Still I noticed what I regard as servility and want of a manly spirit, especially outside of Vienna. The Austrian is often rated as rather low in intellectual and educational attainments ; I do not fully concur in this opinion. Very few, indeed, of even the lowest class, can be found who have not some education, and I regard them as quite equal, intellectually, to our own people ; but they are not nearly so industrious as Englishmen. This rather surprises me, as I have seen these people, by their industry, thrift, and sobriety, acquire property in a remarkably short time in the United States, and I always regarded them as among the most industrious of the American population. But whatever their position now, they are advancing by immense strides intellectually, socially, and politically, at home. Provident societies are a thriving institution in Austria ; nearly every workman belongs to a Friendly Society. The weekly payment is about 10d. ; the weekly allowance during sickness, 10s. ; and funeral allowance, £2 10s. These benefits appear ridiculously small to us, who, for a weekly payment of 6d., can secure 10s. per week (from temperance societies, 12s.), and £10 at death. But these societies are purely local, and must therefore be very expensive in their management, and with us would not be deemed safe. Perhaps this accounts for the smallness of the benefits.

I was informed by several persons in Vienna that they had no poor—miserably poor. As I had seen men and women sleeping all night in the streets, within a yard or two of the tramway cars, I thought our people would be either heavy in the head or light in the purse, were they to court balmy sleep in such a position. Certainly, I never saw nor heard of a beggar while I was in Germany, whereas, in London, I should have seen hundreds.

I was assured, that in Vienna one half of the children were born to parents out of wedlock ; that it was common for a business man to have a much larger family than lived under his roof or in his rooms. In a large city like Vienna immorality is to be expected. But, when nearly the same may be said of a place like Brunn, there exists a state of things which would alarm us at home. I was informed by persons who were enabled to know, that living together without marriage was very common. The conditions or hindrances to marriage, are such as would bring about like results at home. First, the Church is forbidden to marry any person without the consent of the parents ; people in love have no will of their own, and cannot be expected to regard the will of others. The parties must also have the consent of the Burgomaster and the authorities of the place of their nativity. This can only be obtained if it can be shown that a family can be supported by the contracting parties. If people intending to marry could be thus deliberate, they might hesitate at marrying at all.

All able-bodied men are liable to serve in the army. A man cannot marry during this time, unless by the consent of the Secretary of War, or the general under whom he is serving.

No wonder, then, that all is observed but the ceremonies. I believe it would be the same here ; for in these matters, at any rate, men and women are not governed by statutory law. A recently made law enables a woman, who has lived with a man, to prevent his marrying another ; but of course he may live with the second as he did with the first. It is a dull novel that does not contain a few elopements—matrimony is ignored in this kind of literature. The marriage ceremony has become, is fast becoming more unpopular, as is shown not only in novels but on the theatrical stage, and I am afraid by our own returns.

After all that is said of Vienna morals, I could not but notice the fewness of the lewd women in the streets, their remarkably good behaviour, and the almost total absence of that low type of manhood one sees at home, dressed mostly in the "natty" garb of the do-or-be-done racing fraternity. Still my first opinions and those of my interpreter, and a Metropolitan Police officer, received a dreadful shock, when the former in our company lost his watch whilst waiting for a tram-car. But Exhibitions bring certain gentry long distances for profitable employment.

SANITARY MATTERS

are officially reported to be "good among the mining population;" yet all I was able to see or learn went to prove that sanitary science was not only not understood, but misunderstood. Until visiting Austria I had supposed that no worse system could be devised than our open cesspool. I was mistaken. We have had much discussion on ventilation of sewers. I found the thing accomplished in Vienna, with this difference, that we talk of ventilating into the open air, in Vienna they ventilate into the houses, by means of so-called water-closets, but which are badly constructed privies without traps; the water used being slops from the rooms, &c., though this will not be excessive, as the water is brought from pumps, often a goodly distance from the house, and perhaps carried up many flights of steps or stairs. Traps, such as we insist upon, in and around our homes, seem to be little known, at least they seem little used in Austria. Whenever we came near a grid, our nasal organs informed us with emphasis. The open street gutters, or sewers on the surface, all over the Continent, are simply disgraceful. A happy contrast to this are the scrupulously clean apartments of the people, who also never omit the weekly bath. I can name some dozen very large public baths in Vienna, some of which can be converted into places for meetings or amusement. There are excellent floating baths, which may be called rafts, and are anchored in the middle of a river; the outside can be used by swimmers. The raft resembles a flat-bottomed boat, divided into so many private baths, a space of each being above the water level, and devoted to dressing, &c. Boats convey bathers to and from the shore, including the bath, for 5d. A healthy, private, and safe bath is thus obtained. With the two exceptions named, the Germans have yet to fully learn, that, even on the grounds of selfishness, it is wise for the wealthy to see to the sanitary condition of the poor, as the rich are not free from contagion should it attack the poor; to say nothing of the national loss caused by the non-production of the sick; and as each workman is worth a given sum to the State (as he produces more than he consumes, by the profit on his labour, &c.), the death of a workman is a loss to the country.

At Aix-la-Chapelle I passed through a fair, composed, for the most part, of just such exhibitions of mimicry, marionettes, tawdry, painted faces, &c., just such folly as at our own fairs, minus the drink and disorder. It is also to be hoped that a Government which has had the wisdom to organise and carry out the greatest of Great Exhibitions, will soon withdraw its sanction and patronage from the Lotteries, so that we may no longer witness the national arms over a shop or office from which is announced all about the various "drawings," &c.

In conclusion, I would say, if, as I believe, one and a quarter hour's labour per day will earn for every man all that is needful for his health, and if the Germans go on with anything like their present frugality, our commercial supremacy may be in danger; for as one person in England can produce calico enough for 550 persons, we must look to other nations to purchase the bulk of it. And so with other goods, for we are the world's principal workshop. At present, it is clear that Germany has a much broader margin for improved production than we have. It has the elasticity represented by how far we are in advance of them. We can, in the main, only improve on ourselves, whilst they are armed by education and aided by our example as to work. So far, we seem to be superlatively their superiors in sound, solid, utilitarian workmanship, and, I may add, in bad taste. As Austria advances in industry, let us hope she may less need that her chief cities should have immense barracks, her streets be guarded by armed police, and that her tenement hives may give place to homes, which we love to call our "castles." On the other hand, we can learn of our German cousins some of their frugal and temperate habits, polite demeanour, and good taste. The exchange will be a mutual advantage.

I am deeply sensible of the honour and responsibilities of my appointment as reporter, and of the kind and courteous assistance I have received on all hands from our own countrymen, and the proprietors, managers, foremen, &c., of the various manufactories in and around Vienna.

A Survey of the Exhibits connected with the Cotton Manufacture.

By JOHN CAMPBELL (*Messrs. J. and J. L. Gray's, Manchester*).

AS there was no official catalogue of the Exhibition to be had, it was rather a laborious undertaking to discover where all the cotton manufactures were to be found, therefore this report may possibly not notice some exhibits, though this can scarcely be the case, as every manufacturing country has been noticed.

I have strictly confined myself to report conscientiously upon what *was* exhibited, refraining as much as possible from comparisons with things which *were not* in the Exhibition. I have also strictly adhered to the functions of the situation to which I had the honour to be appointed,—namely, "Artisan Reporter" on the Cotton Exhibits.

Although I have ventured incidentally to mention lace, gloves, and hosiery, as being part of the cotton manufactures, it will be observed that no opinion has been expressed as to those goods.

There is, however, one class of goods of which I have some considerable knowledge, that is, "fancy dresses" manufactured with cotton warp and woollen weft. This class the Report will not notice, but it may here be stated, without the least impropriety, that a Bradford firm exhibited goods of this class unsurpassed by any Continental house.

This report of the cotton manufacture exhibited in the Universal Exhibition at Vienna, 1873, will be divided into three sections. The first will treat of the raw material, the second will be devoted to the machinery employed in the manufacture of that material, and the third will deal with manufactured goods.

SECTION I.—THE COTTON EXHIBITED.

For obvious reasons, the United States of North America first claim our attention, and they have indeed furnished an interesting exhibit of the various qualities well known in the market. The Mobile (Alabama) Cotton Exchange, as well as that of New Orleans (Lousiana), were well represented, the latter exhibiting nine sample bales accompanied with statistics. Besides these collective exhibits, and those of several private firms in the above-named States, there were samples from St. Louis (Missouri), Lee County (Mississippi), and Uplands from Memphis (Tennessee). Independent of these native exhibitors, several firms in England and other countries exhibited North American cotton from the bale, and in its various stages of preparation for manufacture.

The United States of Venezuela exhibited four sets of samples of superior looking staple, the best looking being Sea Island from the plantations of Tocoran, on the coast of Valencia ; then came fine cotton from the valleys of Aragua, the State of Barcelona, and that of Yaracuy.

The Brazilian Empire had a gigantic display of the cotton cultivation of its various provinces. The Town Council of Pernambuco, in the province of that name, sent samples of herbaceous cotton (*Gossypium herbaceum*), and several planters in the province of Bahia exhibited samples of the same kind, with black seed, several samples of green and yellow Maranham, independently of the usual sorts well known in the market by the names of the provinces where they are grown,—*i.e.*, Bahia, Pernambuco, Maranham, St. Catharina, Amazons, Parana, &c.

The British colonies or possessions that sent raw cotton were few, the largest exhibit being from India. The local committee of Berar, for the Government of Bombay, exhibited upwards of 700 samples of the produce of Western India, consisting principally of cotton, cotton seeds, and goods. The local committee of Indore exhibited the produce of that locality. There were several small bags from the Cape of Good Hope, and a collection of samples from Australia, including cotton grown in the Botanical Gardens, Brisbane, as well as some from Moreton Bay, grown from New Orleans seed, and classed as "good fair," at 9½d., 9¾d., and 10d. per lb.

The French possessions and colonies were exceedingly well represented, Martinique, Guadaloupe, French Guinea, Senegal, West Coast of Africa, Island of Réunion, New Caledonia, French India, Cochin-China, &c., all sending samples, with no less than eight exhibitors of Tahitian, and four times that number of Algerian grown cotton ; the thirty-two lots from Algeria, with three exceptions, being what the French spinners call "Georgia Long-staple," or Sea Island. On close inspection these samples would bear favourable comparison with American grown cotton. The following statistics were posted to this exhibit. "There was exported from Algeria in the year

1868	376,982	kilos. of	long-stapled cotton.
1869	282,584	,,	,,
1870	346,899	,,	,,
1871	271,479	,,	,,
1872	241,362	,,	,,

1,519,306 kilos., or 3,418,434 lbs. of cotton, little, if anything, inferior to North American Sea Island.

From Italy the Royal Industrial Commission of Turin Museum and the Exhibition Commission of Caserta had collective exhibits of Italian grown cotton, and thirteen private planters had fair specimens of European cotton, *i.e.*, Italian.

Greece had five exhibitors of cotton in the pod, and many provinces of the Ottoman Empire sent very good samples.

The Government of the Khedive of Egypt had a collection of thirty-five different sorts, several of them approaching, in appearance, to good Sea Island. Annexed to this exhibit was the following :—“ Exported from Alexandria in

1821	944	quintaux, or	105,728 lbs.
1872	2,013,433	,, or	225,504,496 lbs.”

The neighbouring states of Tunis and Morocco were represented with good samples. There was yellow-flaked cotton from Roumania; and from far away in the East—Siam, China, Japan, and Persia—came samples of the plant, which these nations cultivated and manufactured long ages before the great cotton-farm of the world—North America—was known to civilisation.

It will be seen from the foregoing, that nearly every nation, or, more properly speaking, the inhabitants of every settlement, as well as those of the Continents, where climate and other conditions of nature are favourable, cultivate with assiduity a plant which has supplied the means of raising this country to a degree of prosperity never before attained by any nation ; and that by giving judicious encouragement to those countries where cotton can be advantageously cultivated, England need never again be at the mercy of the United States of North America for her supply.

SECTION II.—THE MACHINERY USED IN THE COTTON MANUFACTURE.

Cotton, when gathered from the plant, is full of the seeds which it clothed and kept warm in the pod until they arrived at maturity. To get rid of these seeds, without injuring the fibre, which varies in diameter from ·0005 to ·0007 of an inch, various means were tried previous to the invention of the cotton gin. There are two exhibited, and two models.

(A) *The Cotton Gin.*—The only "gin" at work in the Exhibition is made by Messrs. Platt, Brothers, and Co., Oldham, and it is called the "patent double-roller gin, with hopper feed." This machine certainly does its work well, taking away every fibre from the seeds, and delivering the cotton clean and open, so much so that it could at once be put into the breaker card. The following is Messrs. Platt's description:—"This machine is well adapted to separate any description of cotton from its seed, but especially so to the class of cotton adhering to seeds having the husk, or shell, covered with short fibres, technically termed woolly seeds, of which American uplands is a principal variety. The roller gin has hitherto proved inefficient for this kind of cotton, in consequence of the seeds, after separation, becoming entangled with the seed cotton, and obstructing the action of the roller and knives.

"In the machine exhibited, this is obviated by the combined action of the moving and fixed grids. At each elevation of the moving knife the grid, which is attached to the same, lifts the cotton to the level of the fixed knife-edge, and to the exposed surface of the roller, and on the descent of the moving knife the seeds, which have become separated from the fibre, are disentangled by the prongs of the moving grid passing betwixt those of the fixed grid. The action of the rollers and knives is also shown by a full-sized model. The out-turn of clean cotton of this class is about 120 lbs. per hour, but of cotton having smooth seeds, as much as 200 lbs. may be obtained."

The next is called the "American needle cotton gin," made at Remmington Works, Ilion, New York. Patented June, 1866 and 1867, reissued 1868, the English patent dating from 1864. H. Scattergood, patentee. This gin was removed from the Machine to the Agricultural Hall, and was not set to work, so that no comparison can here be made between it and the roller gin as regards work.

In the Cape of Good Hope exhibit there was a well-made model of the "Dharwar saw gin," to gin American cotton, or rather cotton grown from American seed. It was made and presented to His Excellency Sir Seymour Fitzgerald, for the "International Exhibition, by the native artisans of the Dharwar Cotton Gin Factory, Dharwar, 1872." There are then to be seen in the Exhibition, "the roller," "the needle," and "the saw gin." Each of these has its partisans, but to unprejudiced or unbiassed observers, it is evident that the "patent double roller gin" has a good career to run.

(B) *Preparation and Spinning Machinery.*—There is only one firm exhibiting the whole process of preparing and spinning cotton, viz., Joh. Jacob Reiter and Co., cotton spinners, machinists, &c., Winterthur, Zurich, Switzerland. This exhibit consists of all the usual machines, scutcher, &c., lap machine, first and second carding engines, drawing frames, slubbing frame, two intermediates, fly frame, and self-acting mule. Of this machinery there is absolutely nothing whatever to report on as being new in England, whatever may be the case elsewhere. On the carding engines there is Messrs. Dobson and Barlow's patent self-acting stripping motion, and John Hetherington and Son's patent coiling motion, the latter being also on the drawing frames; these motions are working on the machines referred to, without any mention being made, so far as could be seen, of the patentees or their property.

(C) *The Power Looms Exhibited.*—There were looms from various parts of Germany, Austria, England, and one from the United States. The last claims attention on account of "Ross's independent shuttle motion," which is, at the same time, simple and ingenious. The inventor states that it can be driven at a speed of 300 picks per minute. The pickers are perpendicular and are worked by two heart-shaped wheels on the driving shaft; being pressed back alternately, each picker is forced into its place again by a series of spiral springs, acting independently on the shaft, which keeps the picker in its place. This loom is driven by a patent friction pulley, which fits inside the pulley driven by the strap, and as soon as the loom knocks off, through the weft breaking or otherwise, it stands instantaneously still. This loom was in motion, but no warp being in, no definite opinion can here be given of its capabilities.

Without hesitation it may be safely affirmed that, for both plain and fancy work, the looms exhibited by Mr. George Hodgson, Thornton Road, Bradford, Yorkshire, were (if equalled) unsurpassed by anything in the Exhibition. He exhibited four or five, the following description of which was transcribed (with permission) from the statement drawn up to lay before the International Jury:—

"No. 1, Plain Loom. This loom has 34 inches reed space, and can be made to weave mohair, silk, worsted, or cotton. It can be filled up to 8 treads, as well as figures and Jacquard. It can be driven very fast, say from 200 to 300 picks per minute. At the International Exhibition, London, 1862, one of the same kind ran at upwards of 450 picks per minute, earning the gold medal that year in London, and the only gold medal in Paris, 1867.

"No. 2, Rep Loom. Specially arranged to weave reps, with the advantage that very delicate and fine wool warp can be used. It can also be made to weave merinos, orleans, and twills. The friction or letting off motion is quite new, and different from the ordinary kind.

"No. 3. Circular box loom for weaving checks, plaids, or stripes. The models are similar to those of the plain loom (No. 1), but being furnished with a revolving shuttle box, containing six shuttles, will weave any number of even picks of colours, from two upwards, without stopping the loom to change the colours; the box will remain stationary or revolve at pleasure while the loom is weaving. The shuttle box is regulated by a patent lock catch, so that the box cannot overrun itself. The motion is protected by two patents, dated respectively August 11th, 1863, and May 6th, 1864. The aim of these patents is to accelerate the speed of the loom when weaving checks. For although the speed of the plain (No. 1) loom reaches 300 picks per minute, the speed of similar looms with the circular box has been limited to 135 or 140 per minute; but with the application of the patented improvements referred to, a speed is now obtained of, say, from 180 to 200 picks per minute. Besides this, owing to the former unsteadiness of the box, at the instant of picking, the shuttles were frequently thrown out, the workpeople thereby incurring danger of being injured; but this danger is now entirely obviated by the application of these patents. Moreover, the loom is also fitted with another patent for stopping the cards and box motion alone, if the weft fails or is broken. By these various applications, the circular box loom is as easy for the operative to work and understand as the plain one.

"No. 4 is a broadcloth loom with two boxes at each side, and is fitted with sliding picking tappits, for the purpose of picking two shuttles from one side, making up cloth with one small and one thick pick. Backing cloth can also be made on this loom with two different kinds of weft, one on the back, the other on the face; it is also fitted with a new shedding motion for sixteen healds, which can be operated on at pleasure, to rise any head or sink it at any pick required. For tender warps this motion is inestimable, as it will lift the same heald as many times as is required, from the *middle*, not allowing it to go to the *bottom*, or pass through the other part of the warp, avoiding the friction on the warp which takes place in other cases.

"This arrangement is so simple and plain that it can be easily understood by any ordinary workman. The loom is likewise furnished with a 'patent sinking motion' for taking down the healds when required; besides, there is gearing and friction motion attached for letting off the warp, and three strong iron rollers for the warp to pass over, with or without friction as required. The loom can be used either for light worsted or strong woollen goods, and any pattern can be produced up to 16 healds, at a very small cost, by a simple paper card."

There is exhibited in the same department a patent "selvedge motion," by Mr. Jabez Oldfield, Manningham, Bradford, Yorkshire. The object of the patent is to make two selvedges in the middle of a warp. The selvedges are bound fast by two continually twisting threads. Two different kinds of cloth can thus be woven at the same time. After the cloth is woven the selvedges are cut by a circular revolving knife. The patent can be applied to an ordinary loom, and will be found in many instances to be of great service.

The next exhibitor of cotton-manufacturing machinery is Mr. Henry Livesey, machinist, Greenback Foundry, Blackburn, Lancashire. He exhibits a loom 33-inch reed space for plain shirting and printing cloths, with weft stopping motion, positive taking-up motion, &c., &c. This loom might be driven at a great speed, and is all that could be desired for the work it is constructed to perform. His spooling or pirning machines are remarkable for their simplicity of construction, style of finish, lowness of price, and capability of doing their work. Particular mention may be made of a small spooling machine of six spindles, for winding heading bobbins, on the opposite side two spindles for winding knitters' bobbins, with one spindle for unknitting healds. This last contrivance is patented, and is known as the "Patent Utilising Machine." These machines can be made of any number of spindles.

The foregoing are the only English exhibitors of cotton manufacturing machinery, but two Paisley firms show the last process of sewing thread manufacture—*i.e.*, spooling. These spooling machines are made in Manchester, and for the beauty and precision of their work are surpassed by nothing in the Exhibition.

About half-a-dozen Continental machinists sent the various machines used in a weaving mill; of these special notice will be taken of two or three, but in the first place the following firm may be mentioned as the most remarkable on account of geographical position:—

"The Machine Shop of the Imperial and Royal privileged Cotton Spinning Factory of Tannwald, in Tannwald, Bohemia, makers of all machinery connected with power-loom weaving, such as warping, spooling, and sizing machines, hand or power looms, as well as cotton spinning machinery, more particularly double-carding engines for cotton waste, as also for wool, &c. &c.; finally, shafting, steam-engines, water-wheels, steam piping, &c., at the lowest possible price." Such is the literal translation of the card of the Tannwald machine makers, and it may truly be said of their exhibit, that to all appearance it would compare favourably with any other ; a sizing machine, several looms, a warping machine, and a winding machine particularly looking like Lancashire. None of the machines exhibited by this firm being in motion, no remark can be made on their practical capabilities.

From Switzerland three or four firms exhibited power looms, &c. Escher Wyss and Co., Zurich, had three looms, with drop shuttle-boxes for two, three, four, or five shuttles ; they were in motion, weaving checks, and did their work well.

The principal German exhibitors were from Chemnitz, in the kingdom of Saxony. In this department there was a loom from Reutlingen, in the kingdom of Würtemberg, with a revolving shuttle-box, having a striking resemblance to that of Mr. George Hodgson, of Bradford.

Besides looms, the exhibitors referred to had several other machines, such as spooling, winding, and doubling machines, all of which may have some trifling peculiarity of construction, but none meriting any particular notice, with the exception of a spooling machine made by Rudolph Voigt, Chemnitz. It has certainly many things to recommend it to the attention of manufacturers or machine makers.

All the machinery employed in the cotton manufacture exhibited has now been noticed, with the exception of those machines which do not come within the scope of this Report, such as knitting machines, bobbing, net, and lace machines ; and it is certain this part of the Exhibition was exceedingly meagre considering the magnitude of the cotton trade.

It is now only one hundred and four years since the genius of Arkwright gave to the world the true principles of cotton spinning. (His original frames are to be seen in the Patent Room at South Kensington. His first patents are dated 1769, and those for further improvements are dated 1775.) It is exactly one hundred years since the first piece of cloth was sold, entirely made of cotton, in England, and eighty-eight years since Boulton and Watt erected the first engine to drive a cotton factory, in 1785. The engine was erected for Messrs. Robinson, at Papplewick, Nottinghamshire. During these hundred years every nation, in Europe at least, has learned our processes of manufacture, and by purchasing a few of our machines, have learned, not only to make machinery for themselves, but to send their machinery to Universal Exhibitions, there to contend against us for honour and reward.

SECTION III.—THE COTTON MANUFACTURES EXHIBITED.

In the two preceding sections it was a task of some difficulty to discover, in the first instance, what countries were cultivating cotton; and, secondly, to find out those who were making machinery for its manufacture; but in this section the difficulty was to find out the country *that does not* (at least attempt to) manufacture cotton goods.

From the United States there was one exhibitor of yarn, from St. Louis (Missouri) another of yarn; thread and cloth from New Orleans (Louisiana); one with shirtings from Providence (Rhode Island), and another from Boston (Massachusetts).

From the Brazils there were three exhibitors:—One of yarn from the Province of Bahia; the others were calico and sailcloth from the Province of Minas Geraes.

From England there were about a dozen exhibitors of yarns, sewing thread, crochet and embroidery yarns, &c. The exhibits of this class, which appear to be the most complete, were respectively that of E. Ashworth and Sons, Bolton, who exhibited fine cotton in all stages of preparation from the bag to the mule, and single yarn on cops from 18's to 220's, bleached, dyed, and polished yarns and thread; Messrs. Brook, of Huddersfield, who exhibited what is known in the market as six-cotton sewing cotton, and patent glace yarn; John Dewhurst and Sons, Skipton, who exhibited specimens of the manufacture in its various stages, and sewing cotton, bleached and dyed; Messrs. Bowman, of Halifax, who had a similar exhibit. There were no less than five or six Paisley thread firms represented. Coarse spinning was illustrated in its various processes by T. Ogden and Co., Oldham, with cloth, banding, sewing, and knitting cotton, and fishing nets, &c.

There were nine or ten exhibitors of the various kinds of cotton cloth, from plain shirting to velvets. The most remarkable of which were respectively that of Stretton and Co., Manchester; Sir Elkanah Armitage and Sons, Manchester; and

Steiner and Co., of Church, near Accrington, whose Turkey red, cambrics, plain, and printed muslins and handkerchiefs, were unsurpassed by any other exhibitor. Horrockses, Miller and Co., of Manchester and Preston, had a display of long-cloth, calicoes, &c., which were unequalled in the Exhibition.

From Portugal there were nine exhibitors, two of yarns and seven of cloths, &c., the principal being the Spinning and Weaving Company of Lisbon—coarse yarn and cloth; and the Porto Spinning Company—thread and yarn.

Spain was represented by eleven or twelve exhibitors of plain and printed cloth, principally chintzes, but no yarn.

There were ten exhibitors from France, five of yarns and thread, and five of cloth. H. Loyer and Sons, Lille, appeared to have the finest thread. Besides these there was a collective exhibit of thirty-eight firms from Farare (Rhône), consisting of plain and embroidered muslins and window curtains, figured and embroidered muslins by the loom, dyed and finished muslin, and embroidered goods.

Switzerland was represented by no less than forty-eight exhibitors of yarns, thread, and cloth. Nine of these exhibitors put their Turkey red dyed yarns prominently forward. For fine yarns, single and double, thread, &c., the largest exhibitor was Heinrich Kunz, of Zurich, who exhibited single yarns from No. 8's to 500's, and doubled yarns in great variety. Attached to this exhibit was the statement that this spinner had 200,020 yarn and 7,745 doubling spindles. Then came J. J. Rieter and Co., Hinterthur, exhibiting warp and weft yarns, from 6's to 300's, with thread and embroidery yarn. From information obtained from the representative of this firm it appears that they have twenty pairs of mules—400 spindles per wheel—constantly spinning from 200's upwards. As a rule their work is from 200's to 220's; but when the firm can get orders, they will spin any numbers. One thing was remarkable in the goods exhibited by the Swiss (South Cross Gallery, No. 5a.), viz., the paucity of printed goods, and the preponderance of goods woven with dyed yarn. And attention may be more particularly called to the exhibit of J. Heitz and Co., Munchweilen, Thurgau, who, in the Belgian Official Catalogue describe their exhibit to consist of "yarn-dyed cotton goods, for exportation to India, the Levant, Italy, and Africa;" then J. Rudolph, Raschle, and Co., Wattwye, St. Galls., "yarn-dyed cotton goods, for the Levant, Eastern and Western India, Japan, Africa, &c."

There were about three dozen exhibitors of Italian manufactured yarns and goods; and here again Turkey red yarns may be prominently mentioned. Among the exhibitors of yarns, &c., may be mentioned Micheli de Ferrario, Manzoli, Milan, for grey, bleached, and dyed yarns, and grey, bleached, and dyed sewing and embroidering cotton; and the Pordenone Spinning and Weaving Company for grey, bleached, and dyed yarns of various qualities. From Naples there were ten different patterns of hand-loom work from dyed yarns; from Salerno there were three exhibits of raw cotton dyed red, and from Padua there were woven goods of various patterns from dyed yarns and stuff for sail-cloth.

From Sweden there were only three exhibitors of yarn and cloth, the principal being the Rosenlund Joint Stock Spinning Company. Norway had also three exhibitors, one of yarn and cloth, the other two of cotton and mixture goods.

From Denmark there was one exhibit of dyed warp. And from Belgium there were eighteen exhibitors of yarn, thread, calico, and other goods, besides two collective exhibits, one of those being a collective exhibit of the cotton industry of Ghent, consisting of plain and figured cloth; three Ghent spinners exhibited respectively yarn and thread from 8's to 12's, 40's to 60's, and 4's to 50's. There were also eleven exhibitors of lace.

There were eight exhibits from Holland, yarn for candlewick and heavy goods; the most important exhibit being that of the "Hilversumsche Steam Spinning and Weaving Company," Amsterdam. Three exhibitors described their goods as being manufactured for export to British India and Java.

There were exhibits from nearly all parts of Germany, amounting in all to nearly a hundred; the principal being from Saxony, the finest looking being that of the Saxon Sewing Thread Company, who showed the various processes of manufacture from raw cotton to thread.

Then came the Dresden Joint Stock Company, who had an eagle made up of dyed thread. Besides the individual exhibitors, there were several collective exhibits, such as "The Collective Exhibit of the Augsburg Cotton Industry," Bavaria, in which fifteen firms were represented, and that of Alsace representing six firms, of Lauben representing five firms.

The Austrian Cotton Industry was represented by four large double cases, containing the exhibits of ten or twelve manufacturers. Some illustrated the various processes of the manufacture from raw cotton to yarn. The numbers ranged from 6's to 40's, and the calico looked excellently finished. Some of the most important exhibitors were from Bohemia; and in the gallery set apart for Hungary there were twelve exhibitors of cotton goods, the most remarkable being the collective exhibit of New Gradiska, which included cotton cloth of various sorts.

The Russian Empire was represented by twenty-eight exhibits of cotton goods and yarn. The first glance at the Russian manufactures brings the conviction that they are not novices in the trade. One of the firms, Finlayson and Co., Tammerfors, Finnland, had a small pamphlet on their case, from which the following particulars are taken :—"The cotton mill established at Tammerfors in 1820, by James Finlayson, a Scotchman, was purchased by the undersigned (Nottbech and Rauch) in 1835. At that time it consisted of a wooden building, in which 800 spindles spinning low numbers gave employment to about sixty workpeople. Since then, the establishment has been considerably enlarged, and consists, at the present time, of—first, a six story building for cotton and woollen spinning ; second, of five four story buildings occupied for spinning, weaving, and machine shop ; third, a two story building for store and warehouse ; fourth, another two story building for weaving, bleaching, and finishing ; fifth, a one story house for boilers and dyeing ; sixth, a smithy ; seventh, a school and orphan house ; eighth, an infant school ; ninth, gas-works ; tenth, an hospital ; eleventh, a dining-room ; and twelfth, twenty-seven houses of one and two stories for overlookers and workpeople. There are now 40,000 spindles and 950 looms to manufacture cotton, and 800 spindles and 30 looms for wool, occupying 2,100 workers of both sexes from 12 to 70 years of age. More than a third of the whole have worked in the establishment eight, twenty, and forty years. . . . . *Four English* and two German overlookers conduct the work in its different branches, and a manager, *also an Englishman*, is at the head of the whole concern, &c., &c."

Besides the goods exhibited, several firms showed single and doubled yarns, grey and dyed. Some 36's water twist looked particularly well, twofold 60's was the finest. Stefko Brothers, of Moscow, had some beautiful prints.

From the Caucasus there were five or six exhibits of cotton manufacture ; a coarse grey cloth, called "Bjas ;" and striped goods, home made, called "Tscharsaw." Some of these goods were bleached and others dyed red and blue.

The Ottoman Empire sent from the Imperial Factory of Constantinople, cotton cloth, and a native spinner had samples of yarn. With regard to the different provinces, there were in all 3,554 exhibits by nearly as many exhibitors, in the group including textile manufactures, the whole being more curious than commercially useful ; there may have been some yarn and goods which escaped the writer's notice. There was cotton, cotton yarn, and lace from Bagdad, Smyrna, Cherki ; stockings, gloves, and yarn from Syria ; cloth from Aleppo, and thread from Beyrout; cotton cord (white) from many places, with towels and calico and raw cotton from Liban.

From Roumania there were only a few fancy articles, and a few articles of native manufacture from Morocco ; and from Persia about fifty articles of native manufacture, from Ispahan, such as bed-covers, hangings, &c.

From Greece there were about twenty exhibits of yarn and goods, eight of them being yarns only.

Of all the English possessions India alone contributed anything remarkable to the exhibition of cotton manufactures. The committees of Madras, Bombay, Bengal, of the Punjaub, of Indore, and the sub-committees of Oude, Surat, and the local committee of the North-West Provinces, all sending samples of native industry, without reckoning the exhibits of private firms. The India Museum, London, contributed largely to the Indian section of the Exhibition. The Jaffer Ali Spinning and Weaving Company, Surat, exhibited all the processes.

From China there was yarn and different colours of nankeen, garters, ribbons, and cloths exhibited by the Government of the Emperor ; and Mr. Rudolf Schhik, the Austrian Consul at Shanghai, exhibited a collection of samples of all the cotton goods produced in China.

The Imperial Government of Japan exhibited bleached and dyed cloth (blue), cotton goods for men's clothing, muslins, and light goods for summer clothing.

The Government of the Khedive of Egypt had an exhibit of all the sorts of yarn and cloth manufactured in that country. The Government of the Pasha Bey of Tunis had many fancy articles, bleached and dyed towels, shirts, ribbons, &c., and there were several specimens of cloth woven in Morocco.

We have now had a general view of the cotton manufacture as it was exhibited, by many people, at the Universal Exhibition of 1873. It must not be inferred, from the statements in this Report, that the greatest exhibitors were also the greatest manufacturers ; on the contrary, nearly the smallest exhibit of any nation in Europe was that of the English, and we produce more than all the rest of Europe put together.

Of the raw cotton exhibited it does not come within the scope or object of this Report to pass an opinion. America is looked upon at the present time as the cotton farm of the world, and the finest cotton required for the Manchester market is not, as far as is known, produced in any other country. Nevertheless, it is generally admitted that the plant is not indigenous to North America. In Dr. Andrew Ure's work on the Cotton Manufacture of Great Britain (Charles Knight, London, 1836), the author says, "In 1785 the late Governor Jatnall received a parcel of seed of the silky or Sea Island cotton, which came from Anguilla through the Bahamas. In that year and the one following, the seed of long staple cotton, and probably that of Mains and Santees, was also brought into Georgia from Pernambuco and the Bahamas. Sea Island cotton was not extensively raised in South Carolina till 1799, but as early as 1789 about twenty persons cultivated it in Georgia. *It is not known whence the seed originally came.* Before its cultivation in the United States, the cotton which commanded the highest price in England came from the Island of Bourbon. The finest cotton I have ever seen was grown on the plantation of Mr. Benjamin Freeman, situated on Wadmalan Island, about twenty miles from Charleston. It was sold for six dollars and seventy-five cents per pound. . . . Three quarts of the seed were sold as a favour for 150 dollars." This goes so far to prove that the cotton plant being an exotic as far as North America is concerned, other places may be found where the plant might be cultivated and improved; and that if such were judiciously encouraged by English spinners, their own position would be so far improved, that they would be less dependent for their supply upon the United States.

Of the cotton manufacturing machinery exhibited, there is little to be said here by way of comparison. The exhibit being confined to one firm, as far as spinning went, the whole machinery was the common machinery used here for the same numbers, the cotton was well prepared, and the spinning good, the mule being driven very slowly.

As to weaving, the looms exhibited have been fully described; the half-dozen, or so, of German looms which were in motion did their work well, and those that were not looked as well made as they could be in Lancashire; but the attendants upon the machinery at work had not the same appearance of neatness and dexterity observable in the factory workers of this country; besides there exists a feeling something approaching to affection in the mind of an English artisan for the machine he, or she, is constantly employed at; that feeling which the British sailor has for his ship, whose deck he proudly treads, exists in the mechanic for his lathe, the spinner for his mules, and the weaver for her looms. The English artisan understands, as a rule, all the motions and functions of his machine, and humours it as he would a child.

The question may now be asked, can the spinning and weaving machinery made on the Continent be as well, as quick, and as cheaply made on the Continent as in England? This question cannot be answered here, but those interested in the subject will obtain a true answer by referring to the price lists of the makers.

With regard to the manufactured goods, any unprejudiced Englishman would place this country's exhibits, poor as they are, in the very first rank for yarns, thread, and Turkey red dyed goods, bleached calico, shirtings, and printed handkerchiefs; for small wares nothing could surpass the exhibit of Messrs. Waters, of Manchester. With regard to so many exhibitors of sewing and other threads, he will be a clever jurymen who can give a casting vote to decide the honour, where all are honourable. Wishing to avoid as much as possible the mention of particular firms, reference is requested to the names mentioned when noticing the exhibits of different nations. The principal object of this Report being understood to be to point out the true position of England to other manufacturing nations, and not to prefer any particular exhibit to another, I shall proceed to name in rotation our greatest rivals, and endeavour to ascertain if we can keep the lead in the clothing trade of the world.

Next to England France claims our attention for the beauty and excellence of her cotton manufacture, more particularly in the finer class of yarns and cloth; and it is gratifying to see that France, to whom science owed so much in the days of her prosperity, has not neglected scientific industry in the dark days of adversity. The first spinning machine was introduced into France from England in 1787, and the cotton manufacture was fairly established there in 1798*, and the French have certainly made much progress in three-quarters of a century, many mills in Lille spinning from 200's to 400's regularly; but they excel most in the beautiful designs of their prints.

For the lower or medium numbers of yarn, it would be very difficult to decide between Belgium and Switzerland; the workpeople of both countries are equally sober and industrious; if there be any difference, however slight, it is in favour of the Swiss; but the finest yarns, as a rule, are spun in Switzerland. The representative of one firm assured the writer that they had themselves twenty pairs of mules, of 400 spindles each, spinning No. 200's and upwards regularly, and occasionally much finer when they had orders.

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* Dr. Ure's *Investigation into the Cotton Manufacture of Great Britain.*

Russia comes next on the list, not so much as a competitor against us in other foreign markets, but as a nation that can supply its own wants, and do without us; up till now their manufacture has been done by English-made machinery, and superintended by English intellect.

With regard to Germany, or, rather, the German Empire, Saxony alone produces anything at all equal to English goods; the other parts of the empire, although manufacturing fine goods, get their yarns from England.

The same may be said of the Austrian Empire, with its component parts, Bohemia and Hungary; it is questionable if anything fewer than 40's be spun in the whole country.

Of the other European nations who exhibited cotton yarn and goods, they may all, with the exception of Italy, be eliminated from the present enquiry, and the opposing forces will then be reduced to England, France, Belgium, and Switzerland, as the suppliers of cotton goods to all the other markets of the world.

This Report having unintentionally extended to greater length than was intended, will now close with the unprejudiced opinion of the writer, who is well acquainted with the manners, customs, and working capability of the artisans of all the four countries, and that opinion is, that England can and will long maintain the lead against all rivals, in the production of cotton yarns, in the production of cloth made from these yarns, in the high class style and finish in which she sends her goods into the market, and, above all, in the durability, cheapness, and genuineness of her productions, as well as in the high commercial morality of her manufacturers and merchants.

Cotton Spinning and Weaving.

By ROBERT CORNTHWAITE, *Skipton.*

THIS Exhibition furnishes the visitor with a series of views of cotton in all the stages of progress in its manufacture, from the cotton on the tree to the machinery which produces such wonderful transformations in its appearance, presenting to our view an almost endless variety of goods manufactured from it.

In the American section we have a cotton-tree in full bloom from North Carolina. It stands about 6 feet high, and is neatly surrounded with a glass case.

This tree gives us a good idea of the very beautiful appearance of a cotton-field, when ready for picking. Cotton, as is well known, varies considerably in length of fibre, and, to illustrate this, we have a pile of cotton bales from New Orleans and Mobile, classed by the commercial names of Middling, Low Middling, Good Middling, Fair, Mid-Fair, Ordinary, Good Ordinary, &c. These samples are exhibited by the State of North Carolina.

The "Cotton Gin" of Messrs. Platt, Brothers, and Co., Oldham, does its work admirably, completely extracting the seeds from the cotton without crushing them. The sample operated upon was "Smyrna cotton," especially selected on account of the tenacity with which the fibre adheres to the seed.

This machine is more especially intended for the cotton-grower, who in this way may clean the cotton before it is shipped for the market.

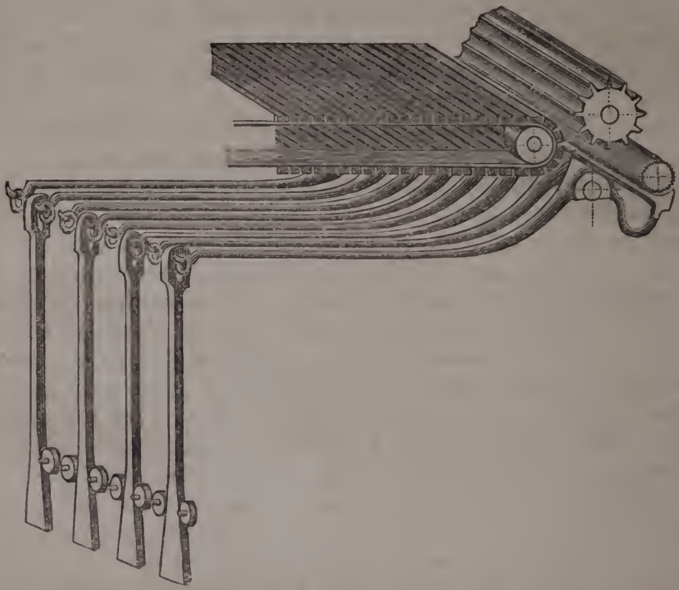
The exhibition of woollen machinery by this firm is on a large scale ; but it struck us as singular that they should have no cotton spinning machinery at Vienna, remembering also that they had such a grand display at London in the Exhibition of 1862, and also at the Exhibition at Paris in 1867.

The only complete collection of cotton spinning machinery exhibited is that made by Messrs. J. Rieter and Co., Winterthur, Switzerland. The machinery they have at work well illustrates the entire process of cotton spinning from the removal of the cotton from the bale to its production into the finest yarns, ready for the lace manufacturer, the thread doubler, or the loom. This enterprising firm was evidently prepared to compare notes with the best English makers. As they are the only exhibitors of cotton spinning machinery, we are quite unable to make a comparison of the machinery of different makers for accomplishing the same purpose; each machine exhibited by this firm is deserving of special attention.

When a bale of cotton is opened, it is found that some few seeds, with a considerable admixture of leaf and dust, remain even after the ginning process, and as the cotton has been very closely pressed together to form a bale, an opener is required to break up these compressed tufts, and bring them into a fleecy condition. One opener exhibited is identical in construction with that made by Messrs. Crighton and Co., Manchester. This was a "single machine," intended to put through about 18,000 lbs. per week. It is not made, however, with Crighton's recent improvements to deliver the cotton in the form of a lap. It has a vertical cone-like beater, which revolves about 1,800 times per minute. This is surrounded with a grid, which allows a great area of cleaning space. The cotton is not held with feed rollers to the beater, but goes in at the bottom and out at the top.

Messrs. John Jacob Rieter and Co. have a cotton-opener of their own design also, which they say is specially intended for long-stapled cotton. The cotton is spread on a lattice feed cloth, at the extremity of which it is taken hold of by a spiked roller. Over this roller is placed a "shell" (as in Tatham's card engine). The cotton is taken from the edge of the shell by a cylinder, about 36 inches in diameter, having eight rows of knife-shaped teeth, which project about one inch. These knives are not intersected with plates. The cylinder revolves upwards from the shell, and is surrounded with a grid, through which the sand, leaf, and seed are driven into an outer case, which surrounds the whole. The cotton is delivered in a loose form after it has passed nearly round the beater.

The lap machine, or scutcher, shown is a one-beater scutcher, with Lord's patent feed part. There is a peculiarity in the levers that regulate the feed which is claimed as an improvement. A coupling-link goes on the end of two levers, and there is only one perpendicular rod to two levers. Where there is a rod to every lever, there is only *one* bowl between the wedge-shaped ends of two levers, and if both levers are lifting together, the bowls cannot revolve, hence it is found that they wear oval and do not move easily. Here there is only *one* perpendicular rod to two levers, which allows space for *two* bowls, and the "regulator" is said to be more sensitive.



Four carding engines are exhibited. The first breaker card had seven rollers and seven clearers—a kind of engine much used where low numbers of yarn are spun. There was a "shell feed part," and the feed roller was of leather cards.

In the other breaker card engine there was a compound or combined arrangement. In this engine there was an iron shell also, and an iron fluted feed roller. Next above the licker-in came three rollers and three clearers; then twelve self-stripping flats. This engine was well adapted for moderately-fine spinning with single carding.

In the lap-doubler there is a self-stopping motion, and the cans are placed in a semicircle, and the whole is so conveniently arranged as to stand in the same room as a carding engine, so as to be placed between the breaker and finisher-engines.

The finisher carding engine was mounted with twenty self-stripping flats, on Wellman's principle, resembling those now made by Messrs. Dobson and Barlow, of Bolton. The back cards were stripped twice for the front ones once, and they were doing very good work ; but I noted that the 18-inch doffer was only making about six revolutions per minute, which is scarcely Lancashire speed. This engine had two pairs of feed rollers through which the lap passed, having a slight draught so as to straighten the lap before coming in contact with the licker-in. The engines were all fitted up with "web conductors" and "patent doffer combs"—which seemed well balanced, and working steadily. Two pairs of drawing rollers were attached to each delivery. I noticed also that a wire brush and stripping roller were placed underneath the licker-in to keep the main cylinder clean, and to save the time otherwise lost in stripping the engine. If the cards are choked they cannot do good work ; but to strip them only once a day (the time said to be required, on account of the stripping brush being used) seems sacrificing quality for quantity. The cards on the main cylinders were all sheets, and the licker-in was a 9-inch roller with leather carding on. Opinion is so divided as to the way in which engines should be clothed that I merely chronicle what I found. The engines exhibited were sufficiently varied to suit the requirements and preferences of different spinners, and, with exact setting and careful grinding, would, any of them, do good work.

There was also a neat machine for brushing out rollers, the casing being so conveniently arranged that all the dust was conveyed away with a fan.

Each drawing box is fitted up with *six* pairs of rollers. These six rollers have an advantage over the ordinary four rollers by allowing the draught to be divided into five places instead of three. The draught being more gentle, less clearer waste works up from the rollers.

The first box had two deliveries ; the second box had also two deliveries, and the third box three deliveries. Eight ends were put up at each head to be drawn into one.

The rollers were weighted with chains passing over pulleys to a lever, the elevation of which at once liberated the rollers from the weight. Both the front and back stop motions seemed very sensitive, the spoons at the back being well vee'd. Although adapted for a 36-inch can, these boxes were not so high as to require a tall person to mind them. The cans from the drawing boxes are placed at the back of the slubbing, and the sliver is passed through three pairs of rollers, reducing it to about a 1¼-hank in thickness. Here the cotton receives a slight amount of twist.

In this frame the bobbin leads the flyer, so that when an end comes down the slubbing will not unwind from the bobbin and fly about. Breakages more frequently occur here than in the further stages, the cotton being in a comparatively loose condition as it comes from the drawing ; the ends at this stage also pass through the rollers single, and not double, as in all the other frames of this preparation.

The ends are next passed through an *intermediate frame*, then through a medium roving frame, and then through a fine roving frame. In the last three frames named the flyers lead the bobbin. It is not that the ends will not run off when they break, as mentioned in the slubbing, but because the frames take less power when the flyer leads the bobbin. When frames are in good working condition, we know that ends should not often break, and as the frames work steadier when the greater portion of the power is transmitted through the fixed gearing, rather than through the "jack in the box," fewer ends break in this way of working than the other if the roving is not drawn too tight from the roller. In very fine roving frames there is great danger of ratching the roving when the flyer leads ; but we were assured that this firm, who are fine cotton spinners as well as machine makers, have press roving frames working with a 25 to 30-hank roving, and as they spin from 150's to 300's yarn it does not seem as if the roving sustained any damage, either from the presser or being led by the flyer.

The arguments that can be adduced in favour of both ways of working are so many, that the mode of working the machinery at this Exhibition will not settle the question as to whether the bobbin or the flyer should lead, and whether a presser should be used for a very fine roving.

Double creels were used at each stage from the intermediate to the mule, and *double ends* were passed through *one boss* at each of these places. This method of passing two ends through one boss is as strongly favoured in some localities as it is objected to in others.

All the frames had two rows of spindles, and the ends going to the front row of spindles passed over a wire which was stretched a few inches in front of the delivery roller. In all the frames they have adopted what they consider to be an improved mode of driving the spindles. The spindle foot rests in a step, and above the foot the spindle has *four flat sides*, which pass through a square hole in the small pinion. The pinion runs on a bearing on the outside of the spindle footstep.

The spindle foot has no pressure exerted on it, and runs true for a much longer time than when the wheel is fast on the spindle foot. The spindle can also be lifted out without unloosing any set-screw.

The driving shaft has an eccentric applied to it, so that all the wheels can be slided out of gear, to enable the pinions to be readily taken off the studs and cleaned. As the pinion wheel is on the underside of the driving wheel, the "lift" can be worked nearer to the foot of the spindle, and the frames can be made lower, which is an advantage in coarse frames. I was referred to persons who have been working this kind of frame for six years, and who say that the collars are in excellent condition, owing to the spindle feet working true, and they much prefer this mode of driving the spindle. I believe that both Platt and Higgins have made frames with this arrangement for driving the spindles, but have discontinued doing so, owing to the increased cost in construction and the expense in oil required to oil the bearing for the pinion. They have also adopted a good arrangement for tightening the cone-strap. A new cone-strap is often put on too tight, and after working awhile is allowed to get slack. It need not be so in these frames, as the belt can be gradually tightened with a screw, even if it should ratch six inches. This can be fixed so ás to be always right when working, and can be used by the attendant to slacken the ends at doffing. This can be conveniently done with a handle from the front of the frame; another handle also at the front is placed to wind up the rack when beginning a new set of bobbins.

The pair of mules exhibited have 600 spindles in each, at a distance of $1\frac{6}{16}$ inch apart. These self-acting mules are made after the principle of Curtis, Parr, and Madeley. I am informed that more mules are made on this principle than on any other. These makers have improved the arrangement by placing the "coping plate" within the headstock, and other minor changes. In this mule there was only one belt used, which is always on the fast pulley when working. There are no reversing belts, the change motion being positive; hence there is no jerking in the movement of the carriage. There is an extra slow motion applied to the rollers, so that when the carriage is near the end of the stretch, the rollers do not stop, but continue to run almost imperceptibly until the required amount of twist is put in the yarn. There was also a letting-off motion, which delivers a few inches of yarn during the putting up of the carriage. The top-rollers were all of leather, and two ends were delivered from each boss. They were spining 80's on one mule and 60's on the other from Upland cotton.

Their wrap-reel is deserving of a word of commendation, being the most perfect I have seen. Seven ends can be wound on at once ; a traverse motion lays it on perfectly regular ; the reel revolves twice for the handle once, and when a hank has been wound on, a stop motion comes into action, and by simply turning a thumb-screw the ends are slackened so as to be easily taken off the reel.

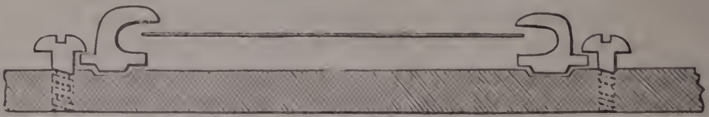
Although the Americans exhibit very little machinery, they keep up their character for the introduction of novelties in “throstle spinning.”

The throstle is one of the most simple, and yet one of the most perfect of machines. It has remained without any material change in the mode of its construction for the last generation.

The Americans introduced a striking novelty at the English Exhibition of 1851, viz., their ring and traveller throstle. Like its predecessor, the “cap frame,” it has not entirely answered the expectations of its most sanguine advocates. As the “ring and traveller” requires about 25 per cent. less power than the “flyer throstle,” it was thought that its adoption would become universal. The yarn, however, proved to be less smooth and silky, and though not so hairy as mule yarn, it has never met with favour in the English market ; so that, except for the doubling of fine twofold yarns, it is not much used. The ring throstle is, however, somewhat generally adopted in America for single spinning.

Sometimes the travellers have been made so that they would go round the ring, or as in the ring rail, so as to get a more delicate drag for fine spinning.

At the Vienna Exhibition a novelty is shown with a ring so hollowed out in the inside that a straight piece of wire, or traveller, extends from one side of the ring to the other, bearing against the bobbin, as shown in section.



The traverse, or lift, is a coping motion. The bobbin is placed on the spindle, and rests on a button, which makes it revolve with the spindle ; the end is then put under the wire and pieced up. In this case the yarn is not thrown round so great a circle, and is said to resemble more closely the yarn produced by the flyer throstle. The spindles can be run at a higher speed than with the ordinary ring (so say the Americans), and the traveller is said to work lighter and with less liability to bind. The ends of the wire may be lubricated with less danger of greasing the yarn than in the old ring. The rings can soon be taken off or put on. One edge of the ring goes under a screw on one side, and a piece is taken out of the ring so as to allow it to drop over the screw on the other side ; a slight circular movement brings both edges under the screws, and the projection at the bottom of the ring, going into a recess in the lift-plate, keeps the ring concentric with the spindle. A little practice soon enables the spinner to piece the ends up quickly. Experience alone can prove whether this new ring and traveller can displace the flyer or not.

With regard to looms, the power-loom is now fast supplanting the old hand-loom, even in Austria, where labour is comparatively cheap. I was, however, surprised to find so few exhibitors of looms. George Hodgson and Son, Bradford, had four looms working, well fitted up for weaving twills, plaids, or plain goods for the Bradford trade. The narrow loom was working at 300 picks per minute, and making a very even piece. A narrow cotton loom was exhibited by Mr. Henry Livesey, Blackburn, which was of the ordinary Lancashire make.

A cotton loom was exhibited from America. It illustrated a few novelties. First, it was driven by a clutch box, which enabled it to be stopped more suddenly than with a fast and loose pulley ; then there was a letting-off motion from the yarn beam ; next the picking-shafts are upright, and seven springs are acted upon by a cam, and when liberated give an impetus to the shuttle. These round wire springs go round a shaft, and each exerts a gentle pressure, so that they are not so liable to break as when one or two springs only are used. No picker is used, but simply a bit of leather on the upright stick, which works in the shuttle-box.

It would be easy to write an article on what is *not* at this Exhibition. England has always taken the lead in previous Exhibitions, and perhaps our machine makers now think they have already done sufficient for the instruction of their foreign competitors. We, who have nearly clothed the world, have not a single spindle of cotton spinning machinery running at this the largest Exhibition ever held.

Cotton Spinning and Manufacturing.

By CHAS. GRINDROD, *Whitworth, near Rochdale.*

HAVING been selected by the Society for the Promotion of Scientific Industry to report upon "Cotton Spinning and Manufacturing" in the Vienna Exhibition, I have the honour to submit the following :—

On entering the west door of the machinery hall, I found the Americans exhibiting a "patent continuous spinner." This machine mostly resembles a throstle frame, with the spindles standing vertically, and turned from an horizontal tin-roller. The threads are delivered from the roll to and from the front roller at the speed required. The holes of the lifting-rail are made larger than the cop or bobbin is required to be made, so as to allow the cop or bobbin at full size to pass through the hole. On the top of each hole of the lifting-rail is placed a cap, and betwixt the cap and the lifting-rail is a small space, sufficiently large to allow a round thin washer to revolve therein. The threads from the front roller pass through the guide-wire (immediately over the spindle front), thence to the washer, and on to the spindle, tube, or bobbin, as required.

The thread being held at the front roller, and the spindle revolving, would cause the washer to revolve at the same speed, and would give twist to the thread ; but as the thread is delivered from the front rollers, the washer revolves slower than the spindle, which produces the winding motion of the thread. By this method of spinning the threads can be wound on to a spindle tube or bobbin, and the shape of a cop or bobbin by changing the motion of the lifting-rail.

The invention is by Mr. H. J. Potter, Norwich, Connecticut, America, who claims it to possess the following advantages :—An increase of production, a saving of power, labour, and waste ; a better thread or quality of yarn than can be produced by any other machine or process ; and an increased production from the loom. It is time only that can prove the invention valuable or not.

This being the only machine of interest in cotton manufacturing in the American Section, I pass on and come next to the

British, where we find a preparation of wool spinning machinery, exhibited by Platt, Brothers and Co., Oldham ; a preparation of flax machinery, by Lawson and Sons, Leeds ; weaving of fancy cloths, by G. Hodgson, Bradford.

All these firms exhibit their latest improvements, which give additional speed or produce a better article, and also their usual good and highly finished machinery, which is very rarely equalled. Beyond the above there is nothing in the British Section. The entire absence of cotton spinning and manufacturing machinery, for which Lancashire is so famous, is remarkable. This feature has not only surprised the English visitors, but the inhabitants of Europe appear disappointed, and inquire the reason, which reason is, perhaps, best known to our large cotton machine makers.

It has been said the distance is too great, that foreign people copy our machines, that exhibiting is not very profitable, and that our machinists are so heavily engaged for the Continent that they could not send machinery to this Exhibition. It is, however, evident, there is some important reason, of which the reader may be better able to judge hereafter.

In the French Section we have nothing to report, but from Switzerland we have a complete preparation of cotton spinning machinery. The first machine is a cotton-opener, which, in every respect, resembles Crighton's patent cotton-opener, as made, and extensively used, in this country. The scutcher has the appearance of the one made by Lord Bros., Todmorden, and has Lord's patent regulating feed motion. The lap, motion, fan, box, and general appearance is very good. The carding engines are of the same size and construction as those in general use in Lancashire, and have good long stapled cotton, carding very light, but contain no new feature. The drawing frame has three heads and three deliveries, six rows of fine fluted bottom rollers, six rows of leather top rollers, which are not weighted separately, but with a lever weight for three or more rollers, which must have a very bad effect on the drawing.

The slabbing frame has three rows of fine fluted bottom rollers, three rows of top leather rollers, which are weighted separately, and run slowly with the fly leading the bobbin, and making a short draft. The intermediate and roving frames are much the same, with the exception of the bobbin leading the fly in the latter case. The mule runs slowly and rather heavily, although it has not a heavy appearance, and has three rows of double-bassed rollers, weighted separately. The mule-head looks well, and contains nearly all our latest inventions. Spins 36, with a draft of about 6, and speed of about 3½ draws per minute.

Finding amongst the whole of the foreign cotton manufacturing machinery no new features of interest to any of my friends or readers, I have ventured to give a short, general description of all the machinery in the Exhibition (of interest on this subject), which it will readily be perceived has a great similarity to that of our own make; but further than this, if honest judgment must be given, without any wish to boast of national superiority, I am bound to say the whole of that machinery is very extensively copied, so much so, that if an English made machine were placed next to one which is now in the Exhibition, it would be difficult for four out of five men to recognise the English made machine. This is an extreme case, but in all other cases the most important parts of all the other machines appear the most perfectly copied.

If we are rightly informed, Messrs. J. J. Rieter and Co. are our most formidable opponents as makers of cotton manufacturing machinery. If this statement is positively true, and their preparation of machinery as exhibited is to be considered the most perfect and complete of all the machinery made on the Continent, no one would have any hesitation in saying that Lancashire still holds the first position.

From England, France, Spain, Portugal, Belgium, Holland, Prussia, Austria, and Switzerland, we find cases containing cotton in its raw state, in all its preparations, and also cloth in the grey and finished state. The coarse yarns and cloths are equal to our own make, and it is only in finer counts that we can boast of superiority.

Nor must it be forgotten that the close resemblance of all the cotton manufactured goods, as exhibited by foreign countries, is due (with very few exceptions) to their make by Lancashire machinery. This feature is a very striking one, and almost compels an Englishman to think there is a greater demand for machinery on the Continent than for cotton goods. If it be so, what is the cause, and what will be the result?

Hitherto, Lancashire in this branch has surpassed the world, and has produced the greatest example of extraordinary prosperity; but what protection or guarantee have we that Lancashire will still hold this position, and be able to beat foreign competition, or countries which abound in cheap provisions, which work longer time, and which, *consequently*, produce a cheaper yarn and cloth than Lancashire can? Lancashire, it is true, built the locomotive, and established the railway system of travelling at home and in foreign countries, which has been of incalculable value to all; but will the sale of cotton machinery and the development of this industry in foreign parts have the same beneficial effect on British commerce, when we consider that cheaper labour, longer time, and Lancashire machinery working at the same speed, is working in competition with Lancashire to produce the same article ?

It must be a disappointment to many to find in this Exhibition so little cotton machinery, and no new feature in machinery of striking interest to our subject. In the Industrial Hall we have found cotton goods exhibited by foreign countries, which have been made by our own machinery, and have considered this as an important feature.

We have, perhaps, no need as yet to fear foreigners' competition, as they are not yet able to do more than supply their own demands. Gladbach, though an important manufacturing town in Prussia, has yet to come to Lancashire for finer yarns and cloth to supply her own demands. We must admit that some foreign countries enjoy natural advantages over which we have no control ; that provisions and labour here continue to get dearer ; that the cry for less work has become an important question ;—all of which tend to increase the value of our machinery in foreign parts, and affect our trade, which ought to have some protection.

Calico Printing, Dyeing, and Bleaching.

By THOMAS ALMGILL (*Messrs. Lockett, Leake and Co., Manchester*).

IT is almost impossible to know where to begin the work of description in the midst of such a profusion of skill, and embracing all nationalities that make any pretensions to civilisation, trading, or commercial enterprise. Between the latitudes of New Zealand and Moscow, every country may consider itself represented in some degree, though not in all cases by its staple products. The reason why this should be so is difficult to conjecture ; but this may fairly be presumed, that if those objects of industry which are exhibited are the best of their kind, we should have a standard of comparison of unquestionable value.

The Vienna Exhibition, as with all previous ones, does not give us the materials for the application of this rule ; as some of the best houses of several countries are not represented at all, and other nations have not a single article to represent the produce of some of their staple trades.

Great Britain is a remarkable instance of this absence of enterprise, or indifference to competition, for, throughout the entire portion of the building allotted to her, she has not, properly speaking, a single print, either cotton or woollen. And were it not for Messrs. Mather and Platt, of Salford, the Exhibition would have been without a printing machine. This machine is a twelve-colour, containing all the latest improvements, and exceedingly well finished.

The question was often asked, why have the English printers refused to exhibit ? Because, was the frequent reply, they have plenty of orders, a steady trade, and, therefore, require no extraneous helps. Others said they were afraid to exhibit their goods for competition, in consequence of the great advance made on the Continent in all departments of the printing trade. Before this last hypothesis could be supported, a great many questions would have to be established, such as the price of cotton, the rate of wages, the hours of labour and its comparative value as to quality and quantity, the price of coal, of machinery, of chemicals, the facilities of transport, and many other details which constitute the comparative cheapness or dearness of any manufactured article.

Whatever may have been the cause of this apathy, it is clear other nations do not share it. Austria, as might be expected, exhibits well in many departments, and in others but indifferently. In group 5 there are a number of handkerchiefs, chiefly block-work, mixed with cotton prints of the most common and simple designs, composed of set objects, plain stripes and small checks. Against this may be contrasted the contribution of Albert Reiss (No. 309 of the same group), whose elaborate designs of flowers in trail stripes, with neatly-executed pin-shading in various colours, is above the average merit, and the dyeing and printing of which are very creditable. Niederlage, of Vienna, also shows some good handkerchiefs and prints, the colours of which are well defined and tolerable in brilliancy, but designs poor.

There are several exhibitions of prints from private or retail dealers of various degrees of goodness; and although not classed as the product of any special manufactory, are nevertheless valuable, as showing the kind of cloth and the quality of the work usually sold in the shops. In this respect she will bear comparison with some of the best competitors. In case 71 are some beautifully bleached goods of perfect whiteness and excellent finish.

Leopold Abeles, Vienna, produces some very fine samples of cotton bleached goods, with a case of prepared cotton wool in all stages of manufacture. Getzner and Co. have a similar case, and of equal merit. The object of these exhibits, and perhaps all others of this sort, is to show the quality of the manufacture in every stage of its progress. In many instances it is difficult to understand why so much has been exhibited where there can be no claim to extra quality of texture, superiority in dyeing, or elegance in arrangement. Doppelt Cardirt's display is very fine, consisting of large samples of cotton wool, in various stages of manufacture, perhaps equal to any in the Austrian Department. Bleached and dyed yarns and cotton fabrics are in profusion about here.

Torrens and Co., Mulhausen, exhibit well in unbleached goods, along with some furnitures, the designs, printing, and colours of which are really good. Schlumberger and Sons, Mulhausen, have similar articles, with no striking difference in workmanship, but first class throughout, the furnitures being a really grand display; and from the position of the case, aided by the skilful arrangement of the prints, the goods are seen to great advantage. They have excellent cotton wool, chiefly American, with cops, dyed thread, and printed trouserings on a kind of moleskin cloth, and fine plush velvets dyed in various colours, the tone and blending of which are of great richness; they are printed in from ten to twenty colours, both glazed and crétonne.

Zurcher, from Mulhausen, has a good display of furnitures and prints—the latter thrown and bundled together, as if they were of no value either to the inspector or producer, though they contain some excellent garancin work, chiefly block.

The Russian Court is dreary and tasteless, though Russia exhibits very creditably, with printed goods, Turkey reds, printed trouserings, and dyed shirtings.

The printed handkerchiefs of Hubner, of Moscow, are of a superior character. Some other cases in this Court are very uninviting, with cases squared and centred, from which long hard lengths of cloth are tightly drawn and puckered, without any regard to colouring or ease; and others in this place are unexceptionably stamped with the same incapacity and want of grace.

The Ottoman Empire has some remarkably fine samples of cotton wool, but the cloth is coarse and badly bleached. In connection with these are some curiously wrought fabrics, interwoven with loose threads about an inch in length, and working out, in some instances, especially where the metallic wire which they use so commonly is judiciously applied, a few elegant designs. Egypt is poor in cotton goods, but abounds in the raw material, showing very effectively the silken and beautiful character of the raw cotton.

Saxony sends some striking dark indigo blues from Königreich—not bad work, but lacking in design. In an adjoining case are some pretty white diapers and a few dyed shades, the quality of the work anything but impressive. Brothers Grossna, from Baden, exhibit a very large collection of common work and styles, such as white and dyed shirtings, and figured cotton goods of no importance as an exhibition. Heross and Company, Baden, have some plainly dyed Turkey reds, the colour of which is only middling—probably garancin work. But the colours and execution of the printed Turkey reds, in red and black grounds, of the furniture designs, are without doubt the richest in design and the most skilfully executed of any in the German Courts; any one not acquainted with the printing business would pronounce it beautiful as a work of ark, but to the initiated it displays an amount of skill and care not often equalled.

Near by are some very fine Turkey reds, and a really good collection of handkerchiefs—not one or two samples as if produced for no other purpose than show, but a commercial quantity, that will stand close inspection, and arranged with artistic taste.

Dannenberzersche, Berlin, have some cotton prints rather common in style of pattern, rather bare, and without effect; but they have a large and well-selected collection of other work in great variety, from neat diaper light grounds, to the dark style of the Paisley Persian shawl pattern: good steam work; the colours look well, aided by valuable and carefully-worked out designs. Gebruder Elbers, Westphalia, exhibit some black and purple stripes and set sprigs, on good cloth, the work being equal to some of our best English prints. In another case they have spinning and weaving products with a few cops. They also show some pretty dark indigo blues with a few diapers. But their chief effort seems to be a serial collection of printed handkerchiefs, put together in the manner of a large book—equal to about one of double folio size—with red borders, and dark or black shaded printed figures in the centre, illustrating consecutively the chief incidents of the late war, beginning with "Wacht am Rhein," interspersed with battle scenes, portraits of all the leading generals, with marches and songs of triumph.

The designs, as a rule, are good, but the execution is dull and flat; so much so, that some of the best scenes are almost lost for want of clear and effective shading. An engraving of the works is given, in which all the above articles are supposed to have been done. They appear to be extensive and pleasantly situated—if a beautiful valley, the absence of house or village, with a high stretch of hills in the background, can make them so.

Bertelsman and Bergman, of Bielefeld, show a case of white shirtings very neatly got up. A. W. Kisker, of the same place, shows an excellent collection of bleached figured goods, very satisfactorily finished.

Italy sends a rather meritorious class of goods, considering the difficulties of her past existence. Cotonificio Cantoni.—This is a neat and artistically finished case of bleached and dyed goods—from the raw material to the finished article; the cotton of which appears rather poor, probably Egyptian. With brocades, are some excellent dimity fabrics, the figures of which stand well up; also some dark dipped blues and printed block work, very fair.

Schlaepfer, Werner, and Co., Salerno, send a small collection of machine prints, and a few furnitures, the whole of which appear to be dyed with madder, with some pretty stripe patterns in aniline black and buff, which have a neat effect.

The comparative tinctorial effect of madder and garancin may be thus stated :—1 lb. of garancin is equal to 4 lbs. of madder ; but in dyeing garancin work, where there is much chocolate, 1 lb. of garancin goes as far or is equal to 7 lbs. of madder. Garancin is a colouring body obtained by the action of sulphuric acid on madder.

Spain exhibits well in printed goods and calicoes generally. Catuluna, Picart, and Co., Barcelona, have a fair collection of prints, chiefly light things ; printing not bad, but finish very poor. Some oxide of chrome, plain shades, look pleasing, and are tastefully arranged. Jose Ferrin and Co., Barcelona, show mostly light work of good quality and style, stripe patterns prevailing ; the way these goods are set out is really fine, and do great credit to the firm. Santonja E. Higos, Barcelona, shows dark patterns, consisting chiefly of dip blues in the old style, blue, orange, and white, and a few small handkerchiefs with buff ground ; altogether a very fair collection. From Achon, Andalusia, are two cases ; one small, and not satisfactorily set out, with cloth and work generally good ; the other, in the course of fitting up, poor and tawdry.

Belgium does not show noticeably in prints, but has an excellent case in group 185 of white-figured goods ; the designs are well brought out and carefully finished.

From Japan, Yokohama, we have cases of flax, raw and in preparation, with a large and well assorted quantity of silks, the colours not over brilliant, but good. Many of the patterns are decidedly English, if not the fabric, and others are most unmistakeably Japanese, with their curious devices, perhaps legendary ones if we only knew their history. A loom similar to those in which these curious patterns were wrought was in the course of erection by a diminutive, dark-skinned Japanese, assisted by a female of the same race, and proportionally small. The machine at which they were working was all made of wood, rather primitive, but neat.

China has nothing competitively alarming. She appears to be more on the defensive than otherwise. All her coloured articles seem as if they had been selected from some museum, as representing some ancient but extinct dynasty. No calico prints to be seen. British India exhibits some poor cheap prints for purposes of covering. The object of the manufacture of these fabrics is honestly stated to be cheapness; but whether it is truthful to call them Indian prints I very much doubt. They appear to be British goods manufactured for India. If so, they should have been found in the British Court. Here they would be distinguished as the only representative of the printing trade of England.

The United States have an extraordinary fine display of raw cotton. Some of the samples are snow-white in purity, and really beautiful in quality. The only thing in print is from the Rock Print Works, Rockville. A small collection of printed goods, very middling in quality, mixed with a considerable quantity of garancin work. Also a peculiar, rather American-looking, black with scarlet blotches garancin colours, with bad chrome yellows, poor, but redeemed in some degree by an excellent collection of woollen cloths.

Brazil makes no show comparable to the United States, but the display, nevertheless, is large, and of various qualities in raw cotton. Nothing manufactured.

New Zealand, as might be expected, has no cotton goods, but raw wool and woollen fabrics in moderate variety.

Australian commercial cotton is exhibited in fair quantity. There are samples here said to have been grown on the Ipswich Estate, Moreton Bay, Queensland, which are classified as good fair, valued at 9½d. per lb., and other Australian cotton classified as fine, valued at 10d. per lb. There is also a moderate-sized sample from the Botanic Garden, Brisbane, grown from New Orleans seed. This is intended to foreshadow what may be done in the future, should circumstances prove favourable. There is, too, a small sample named by the exhibitor "white wheat cotton," from Darling Downs, Queensland. Australia is evidently trying to do something in cotton growing, and if the climate and tillage should be as favourable on a large scale as this sample shows it is on a small one, she may expect a successful future.

The following are the wages of skilled artisans and labourers in connection with the printing business in Austria, Germany, and Russia. The rate of wages in Austria is generally a little less than in Prussia; the machine printers average about £2 per week in the latter place, but somewhat lower in Austria, though they work longer hours. Back-tenters, bleachers, and dyers, and other unskilled hands, 90 kreutzers per day—nearly 2s. English money, or about 11s. per week: time, from 6 a.m. to 6 p.m., Saturday included; the breakfast being taken without any specially appointed interval—that is, they eat it during their working hours; one hour for dinner.

In Russia, printers' wages are £2 per week. Back-tenters and dye-house men and other labourers average 15 roubles per month, equal to £2 10s. Engravers average about £2 5s. per week:

time, from 5.30 a.m. to 8 p.m.; in some print works from 5 a.m. to 8 p.m.

In calculating the time worked at the respective print works on the Continent, we can safely deduct half an hour for the time consumed in eating their food, which would make for Austria and Prussia 63 working hours per week.

The Russian print works, on the other hand, work 81 hours per week, exclusive of one hour and a half for meals. There is one exception to this rule at a print works in the vicinity of Petersburg, where the hands work 75 hours per week, closing at 2 o'clock on the Saturdays. The owner of these works, I am informed, finds it to his advantage to do so.

There is a pecuniary principle, as well as one of humanity, involved in this consideration; for is it possible that any workmen can continuously labour 81 hours per week, and successfully compete with those who only work 58½ hours per week? It is totally impossible, especially when all the degrading influences are considered connected with it. I wonder they can do so much. With employers haughty, exacting, and overbearing, we have workmen ignorant, timid, and servile. With no mental training or time in which to improve their condition, they fall victims to the cupidity and oppressive servitude of ignorant taskmasters. A dogged and unwilling labour is enforced, with no capacity to understand their duties; no wonder that they perform their dull and monotonous round of daily toil reluctantly and unskilfully. Unremitting toil cannot be successful against free labour under any circumstances. We have, on the one hand, poverty, depression of spirits, ignorance, excess of sickness, with comparative mental and bodily weakness. On the other hand, we have shorter working time, with a corresponding amount of vigour, intelligence, and training, to which long hours would be surely fatal.

It is a singular fact that the people of England, who work the shorter hours, are better paid, and their employers the richest in Europe; whilst the Russians, who work the longest hours, are the worst paid, and the most ignorant and degraded within the pale of civilisation. I know that reasons may be given which would appear to modify this view, but the coincidence and the facts remain nevertheless. Be this as it may, every year must bring with it fresh concessions to overwrought labour. But will not commercial enterprise necessarily limit both wages and time? It will always do so within certain limits; but these limits will vary according to the changing circumstances of trade and its relation to the employed. If co-operation should be favourably developed, it is hard to tell what these circumstances may be, and foolish to attempt it.

But one thing is clear, that the longest hours mankind can work are not the most profitable to the employer or beneficial to the employed; but that time is the most profitable to both which enables the workman to "recruit his exhausted strength" with the stimulus of rest, so that he may have a conception of labour beyond the beast, and perform the duties of the day with earnest cheerfulness, and a conscientious regard to the contingencies of competition.

In taking a retrospective view of the printing business for the last twenty years, and comparing the impressions left on the mind, after this reflection, with the choice samples of printed cloth in this Exhibition—or in any of the preceding ones—we are at once struck with a very familiar similarity, in style or design, in all the cheaper class of goods. In real quality of design there is a palpable deterioration, resulting probably from several causes. It may be in the want of a cultivated taste for the beautiful in the purchaser, or a desire in the producer to reduce the manufacture of his goods to the lowest possible expense, resulting from competition, avarice, or poverty. Now the mechanic is trying to do the work of the artist. If the designer produces a pattern full of pleasing and beautiful conceptions, the mechanical genius of the printer is immediately employed to cut it down to working order. It is pronounced "impracticable." This generally means it is too expensive. "The engraving would be enormous, and the extra colours and care required in working it out would eat up all the profits." To such an extent is this process of thought carried, that all the branches of the trade now are reduced to weighing and measuring, and the successful workman is he who can do this part of the business best. And this state of things is likely to continue so long as the "greater profit" idea rules the market.

Exceptional circumstances will arise, where high art and unusual care are required to execute some special design of an intricate and elaborate nature, several instances of which have already been given, but it is not the rule. And although here and there are to be found some captivating and gorgeous display of the workman's art, portraying with infinite skill the combination of rich and varied colours, it is to be deplored this statement applies only to a very small portion of the prints exhibited. Bengal stripes, rings, squares, honey-combs, diagonal lines, a few simple trails and stripes, small pin objects, with roses and pines, form the staple product of the universal printer.

This is the character now, and has been for years without alteration. The change that has taken place is as much as we should find in a garden whose decoration is confined to a few simple flowers. The gardener may alter the shape of his beds and borders, from season to season, but *there* are the same flowers, with their monotonous recurrence ; just so with our present effete patterns ; they are all the intimately allied species of an extinct genus. Unfortunately in this case the species are almost permanent.

No reported improvement in the printing business can be given, except in colouring, and this is almost perfection. I have been informed on good authority that the entire method of printing, bleaching, and dyeing on the Continent is now worked entirely on the English system, and that skilled British workmen are to be found in this department of labour all over the Continent, receiving considerably higher wages than they can get at home. This will always be the case where there is a deficiency of skilled hands, and arises from the necessities of a growing trade ; but a trade supported under such circumstances can never become great, except assisted by some special privilege or protection, because it is skilled hands which give the greatest value to all manufactured produce, and where these have to be imported at an unusually high rate of wages, it must of necessity diminish the competitive power of the manufacturer who imports it. Of course I reason on the supposition that unskilled labour is of nearly the same value in all countries, which may not be absolutely correct ; for we can readily suppose that where skilled labour is abundant and native, the unskilled hands employed to assist must in some degree be instructed from actual association, and so help proportionately to increase the profits of the trade. So, on the other hand, where the value of skilled work is high and scarce, unskilled labour will be proportionately feeble and deficient in helping power, and must be a serious drawback to the profits of the employer who is subject to this double disadvantage.

The wages of unskilled labour may in reality be considered the same in all countries, for their profits seldom if ever rise to a sum beyond that which is barely necessary to support them in food and clothing ; so that in calculating the advantages or disadvantages of foreign competition, they can be safely left out in the calculation.

In summarising this brief review of the printing business, it can safely be inferred that the quality of the prints exhibited, as representing the competitive skill of different nations, is not sufficiently distinctive to be pronounced superior in any one section. Here and there, as I have already named, are to be seen in bold relief some striking display of art and beauty. Beyond this, the general appearance is flat and tame. But the price at which the cloth is sold, including the entire expense of production with the profit to the manufacturer, is wholly unknown here ; so that the elements on which a true calculation can be based, are absent. It may generally be inferred that the English printer has nothing to fear from foreign competition. The wages he pays are not greater than the foreigner gives, all things considered. Coal, dear as it is, is cheaper here than on the Continent. The hours of labour are not so different, with the exception of Russia, as to cause alarm. They are not troubled with turn-outs or lock-outs. There are no demonstrations for higher wages or shorter time. They are blessed with that which all masters desire—intelligent, industrious, and docile hands. Throughout the printing trade of England and Scotland there has been no business less disturbed, and no employers have less cause to complain of fluctuations, either in the price of the varied articles they consume or in the changes of the value of labour.

Design in Wood, Metal, and Stone.

By RICHARD A. BASTOW.

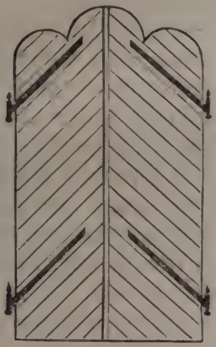
IN the body of my Report I have mentioned nothing that I saw outside the Exhibition, although there were many objects of interest on the journey which deeply impressed me. At Dresden, for instance, I was struck with the peculiar ornate appearance of almost every part of it. The houses generally are built of brick, then plastered and ornamented with cement, the gable ends being frequently panelled and otherwise ornamented. The roofs of the houses do not present that unbroken, monotonous, and heavy appearance to which we are so much accustomed; they invariably break their lines of roof with attics, hips, &c., and sometimes very ornamental ones. Most of the windows have outside Venetian blinds, which, when drawn up, are cased in with an ornamental board, answering the purpose of an ornamental freize to the outside window cornice.

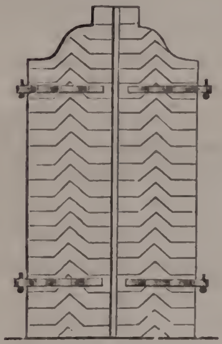
While in Dresden I saw a very simple but very neat design for palisading in one of the public squares. The inside ornamental work was made of $\frac{5}{16}$ wire, looped together after the pattern of the scales of a fish; this was held tight by top and bottom bars, and about every eight feet apart were ornamented cast-iron posts, with very low stone coping. The whole had an appearance of lightness and good taste combined with strength, well deserving notice.

The railroad station platforms and many of the public causeways are paved with broken stones, such as we tip on our highroads; they are of two colours, blue and white, and they set them very carefully, in patterns which have a very pleasing appearance. The fences round the fields and gardens are generally young branches, lopped and nailed diagonally to a top and bottom rail of like material. The spaces between windows and round doorways, both in brick and wood houses, are often ornamented with branches ripped down the middle to give a flat side to nail to, and in the corners a fir cone is split and tacked on; thus satisfying, at a cheap rate, their desire for ornament.

I was much astonished to see young women sweeping the streets of Vienna, but much more so to see them running up a ladder with bare feet and a load of concrete on their heads. Messrs. Tall and Co., of London, are building a concrete cottage of two storeys in the Exhibition grounds; it is very near completion, and the whole of the work has been done by Bohemian girls.

In Prague I saw some house doors that struck me, and which are worth reproducing.





The Votif Church in Vienna is one of the most beautiful monuments of German Gothic. The spires ascend to a great height, and are composed of scores of lesser spires and arches in beautiful clusters. The extreme lightness of its appearance and the profusion of decoration cannot but arouse a feeling of pleasure in every one who beholds it.

At the grand entrance to the Exhibition everything was most carefully and pleasantly arranged for the accommodation and comfort of the thousands of visitors, and to gratify the taste of the most fastidious. It is a perfect paradise; the walks are all shaded by exceedingly tasteful and light wood-work, supported by posts, equidistant, and in the angles made by post and wall-plate are ornamental brackets; around the posts and creeping amongst the ornamentation are climbing plants, forming natural festoons, delightful to look upon; ferns, flowers, and shrubs in beds geometrically laid out; trees, fountains, and the like, made an impression the remembrance of which is refreshing indeed.

The Exhibition is such an extensive building, and so surrounded by gigantic trees that it is impossible to obtain a really good view of the whole. The different parts of the building are so justly proportioned one to another that the immensity of length, breadth, and height are easily lost sight of.

AUSTRIA.

On the floor of the Rotunda is a Gothic pulpit of very fair design; but it is made of cement. Now, we have been taught by some art teachers to abhor sham in everything, and if a warehouse were to be "run" up in common brick, properly keyed and ready for stucco, it would be condemned; and is there any wonder it should? Have we not seen in numberless instances an ominous crack make its appearance in a stucco wall, in shape resembling a crow's foot; then the centre of the decaying portion appears as though it were gradually drawn outwards, like a flat pyramid, and some very wet day down comes a great patch of the front, leaving a speaking testimonial to the vile stuff the builder daubed on. This is not the case on the Continent. We look around, and find ninety-nine out of every hundred houses stuccoed, but there are no cracks visible, no large brown, mouldy patches, no corners knocked off, nor any appearance of sham. No lines drawn across and cut into the face of the plaster, to make believe that the building is of large, solid, square stones. It is used fairly as composition—a much cheaper commodity than stone, capable of quite as much ornamentation, and, mixed as they mix it, lasting a long time; in point of cost, bearing no comparison with stone. It is to the general use of this material that we must attribute the substantial, respectable, and cheerful aspect of the streets of Dresden and Vienna, so unlike our narrow long perspective of brick cottage houses. Some of our very best furniture is veneered, and it is the better for it. Why should we not veneer our houses if we can obtain material that will last as long or longer than the brick on which it is hung? And so capable of ornamentation as it is, would it not be a step in the right direction?

In the body of the Exhibition, and not far from the Rotunda, is an Ionic entrance, mounted on a platform, and all round the platform runs a framed base of light and dark walnut. The lower two-fifths of the shaft is very well carved; in the pediment are some bronze figures; the doors are three-panelled and folding, the panels being raised about five-eighths of an inch above the level of the stiles, and veneered at 45 deg. The handle to door is a lever, and not a knob, such as we adopt. The projection of panels does not look so bad as we should be apt to think, and to open a door it is much easier to press down a lever than to squeeze a polished and slippery knob, and run the danger of spraining our wrists.

A little further on is a zinc fountain, a very ornamental piece of work, but I cannot help thinking that if it were placed in position in a public place, it would soon be battered up, and be ready to weigh in.

As the population of our cities increases, and land becomes more valuable, our landlords build us smaller houses. Thus compelled to huddle together, and be warm, our grandfather's old four-post bedstead is gradually disappearing; it has done its duty; besides it takes up too much room; therefore light iron bedsteads are taking its place. Birmingham is now supplying nearly all England with strong, light, easy-put-up and easy-taken-down iron bedsteads; but with all her variety in designs, we have yet to see those which will bear comparison with Austrian bedsteads here exhibited. They are made of sheet-iron, circular outline and elliptic fronted. One is a pure white ground, and finished as though it were French polished. A few flowers and leaves, beautifully arranged, form the ornament at the foot and head. The stocks are 12 or 14 inches wide, and a sprig of flowers and leaves wanders the entire length. They look well, very simple, and very fit for a bedroom. There are also examples in black and gold and other colours. They make a much better appearance than the spider-web designs of the generally used class of iron bedsteads from Birmingham. The babies' cots were extremely pretty.

Gerbruder Thonet shows some furniture made from bent wood; the timber for the furniture is first cut in the direction of the grain and worked, then bent to the required shape by heat. The tables appear to be very well finished, but we cannot say that we admire their supports; they have too light an appearance, and must be too elastic to be solid and strong, setting aside the evil consequences likely to arise on exposure to damp. There is also here a portion of a circular staircase, built of bent timber, by P. Reimer; it is well adapted for this kind of work, and makes the strongest kind of staircase; the ease with which the rail can be wrought, and ornamental banisters filled in, all commend it as an improvement.

As an illustration of the natural artistic taste possessed by most Continental nations, I may say, not far from the Rotunda is a bust of the Emperor of Austria, in white marble, set on a painted marble pedestal; round the base of the pedestal runs a box, with a wire-work railing. In this box beautiful ferns are growing; they reach about half way up the pedestal, and look very healthy. Take the ferns away, and the remainder would not look very much; but surrounded as the common pedestal is by the wild, but graceful ornaments of the forest vale, the statue is not only shown to the best advantage, but the fresh and living green gives a charm to the scene.

Some of the Austrian show-cases were badly made, and horribly finished. They have been imitating Milanese work, and have made a botch of it. You cannot make black paint and white stencilling look like ebony and ivory. A number of their show-cases are bronzed.

Some of the wardrobes and cabinets are very well made, and have a very effective appearance, without the detail of flat ornamentation, which we generally put in our work. The designs for clock-cases are, in some instances, very good; they seem to display far better taste in this branch of woodwork than in any other.

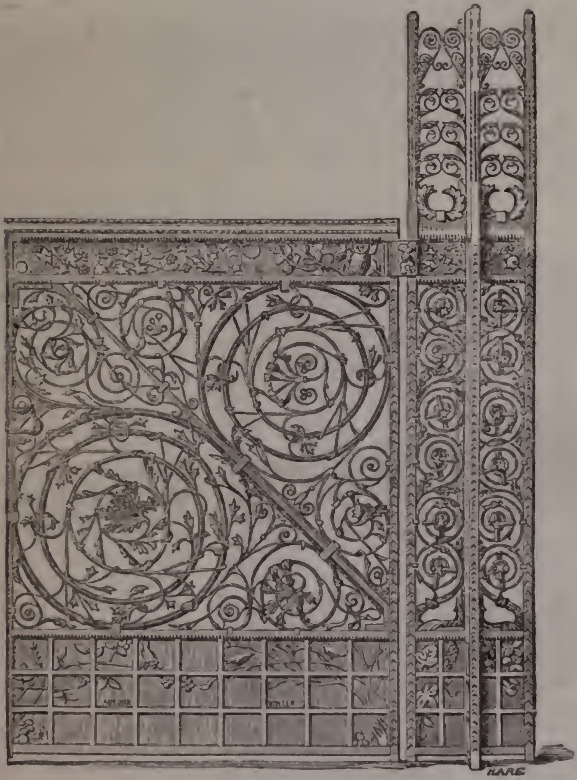
The wrought-iron work which I saw in Austria, with the exception of some in St. Stephen's, Vienna, is scarcely worthy of mention. Although to make an article or a building rather pretty seems to come naturally to the Austrians, yet I am bound to say that in that prettiness may be often seen an utter want of thought and careful study. Austria has much to learn, and there is no doubt she will make use of the splendid opportunities now afforded by the Exhibition of the industry of all nations.

Great Britain.

Englishmen have the name of being the best workmen in the world, and they justly merit this good name, for every nation has vastly benefited by their dogged perseverance in the invention and perfection of machinery of all kinds. We are thoroughly a mechanical people; we do everything by square and straight-edge, and when we have completed a piece of work to our satisfaction, we proudly bring down our doubled fist upon it, and say *that's a good strong job*, forgetting all the time that there is such a thing as ornament. Our work always looks too strong, and full of sharp offensive corners; if we do ornament it, we do so by rule, and instead of clothing it with grace and beauty, we produce an ungainly article, innocent of anything but work. I do not say that is always the case, but I do assert that it is the rule rather than the exception.

In all our workshops the general design for a job, and every little detail belonging to it, is drawn by architects and their draughtsmen, who practically know nothing of a building, or of a piece of furniture; and should an intelligent workman see how an improvement could be made, he dare not mention it, for if he did he would instantly be told to mind his own business, and work to the drawing. Is it to the interest of the employer that such an unfathomable gulf should exist between himself and those he employs? We rather think that this is not the case on the Continent, and if so we do not wonder so much that their work looks better than ours, and that they succeed in producing a better design.

Barnard, Bishop, and Barnard, of Norwich, exhibit a pair of wrought iron gates, standing right opposite the entrance to the British department. As a specimen of workmanship, and minute and well-finished detail in wrought iron, they far excel anything in the building. They are a first-class example of English work and English design. Strength is the prevailing feature; it is the all-important aim; and this idea the designer has succeeded in working out. To count all the angles in them would be no small undertaking; even the very leaves are made to shoot off at a tangent from the spiral stem, in either a horizontal or vertical straight line, then lap themselves round their parent stem. In



the ornamentation the halves are similar, and to copy one leaf, or scroll, would be to copy a great many. Little old-fashioned looking birds sit in some of the panels of the base, which is made to represent the four season. On the upper panels of one gate is another old bird, an owl in an ivy bush, and on the other gate a rising lark, representing night and day. The gates are full of design, and everything has a rectilineal unbendable appearance ; therefore, we must call it very effective.

The Coalbrookdale Company exhibit a grand entrance in mediæval style, consisting of a pair of wrought-iron gates and pillars, with cast-iron enrichments ; the designs in the panels of these gates are well worthy of inspection, they are different in character from the generality of our work, and no two panels are alike. The little perforated panels between the two bottom bars and between the two middle bars, look very well, and are put just in the right place ; the upper part of the gates and posts are highly ornamental, and, as a whole, they form indeed a grand entrance.

Mr. B. J. Talbert is the designer, and they illustrate well what artistic work can be done in cast iron. There is a novelty in the twisted metal of the bars of the fencing. Fig. 1 is one of the panels in which every leaf, flower, tendril, &c., is entirely undercut, although each panel is solid and cast in one piece.

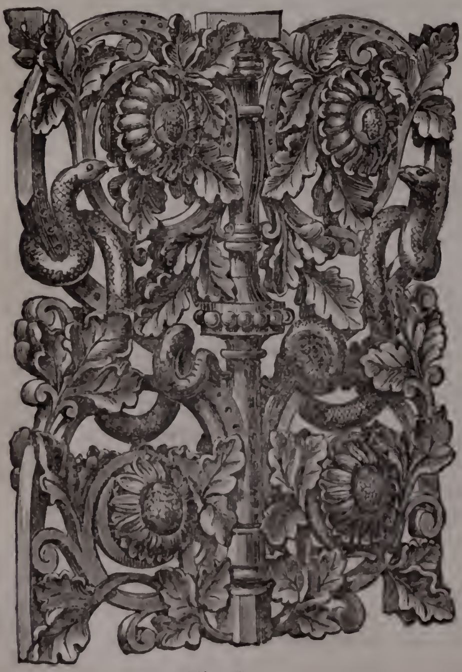


Fig. 1.

The patent twisted metal used for the bars of the gates and fence (Fig. 2) and for the piers, is quite a new feature. A simple bar of very ordinary section iron is twisted by powerful machinery whilst cold, until it assumes a most telling undercut effect of twist. It will be seen that this idea is capable of considerable development, for only alter the section and you produce effects which are numberless in their variety, and from being operated upon when cold the twists are regular, which could hardly be the case were heat applied to effect the ductility of the metal.

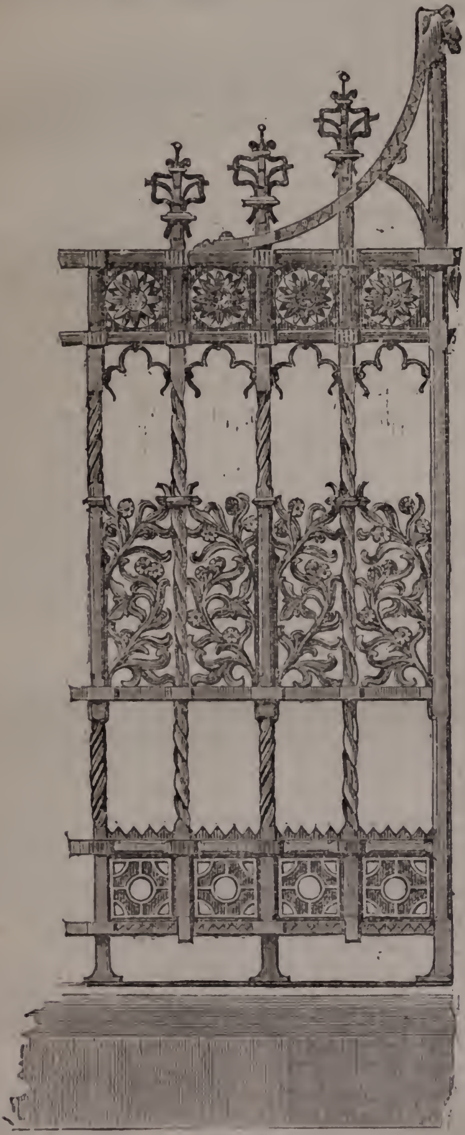


Fig. 2.

Yates, Haywood, and Co. exhibit a marble mantel, enclosing one of the prettiest of fire-grates; not the dingy thing that we are accustomed to, but a highly-ornamental piece of work in polished steel, and brass, and tile; the ornamental tiles form the jambs and soffit of the splayed part of the stove, the general design evincing a great amount of taste.

Messrs. Jackson and Graham exhibit an ebony cabinet in Italian style, which for excellence of finish cannot be surpassed. I learn that the bottom part of this, with a marble top on, was at the Paris Exhibition, it being then in an unfinished condition. The front is divided into three compartments; between each of these is a pilaster, the fluting of which is stopped at about two-fifths from the bottom; the whole is built of Spanish mahogany, and is veneered inside and out with black ebony. There is a quantity of ivory tracery and lining in it, and the ends of the cabinet are quite as full of detail as the front. Anyone unaccustomed to this work cannot conceive what an immense amount of time and care is required in its production; two first-class workmen were fifty-three months each at this job. Look where you will—mitres, shoulders, or fluting stops—all is clean, close, perfect. All along the channels of flutes, and in almost every corner, is minute ivory tracery; the very shelves, which are concealed from view, I examined, and found them beautifully finished and engraved. Blue lapis lazuli is let in in various parts, which adds greatly to the effect; but in fact, were it not for the white ivory ornamentation contrasting so strongly with the ebony, the design would be tame.

Here is also a cabinet table in Italian style, the little pilasters of which are surmounted by capitals full of almost microscopical work; every little mould, bead, and fillet is of different coloured wood; the groundwork of the panels is palm tree cut end-ways. Another cabinet, in pure Greek outline, is highly ornamented by different coloured woods and ivory, being inlaid in Oriental style. All these cabinets depend upon the ivory for their very beautiful appearance; this kind of ornament exhibited by other nations is miserably executed when compared with work so faultless as this is, and so full of chaste design.

Morant, Boyd, and Co. show an enclosed toilet-stand, divided in three compartments, and standing on four slight turned legs, but, like a stout man with very small understandings, it does not look particularly graceful.

Mr. Walker, manufacturer, exhibits a bedroom suite. The middle parts of the stands are 9 or 10 inches higher than the sides; the sides have three drawers, about 3 inches deep, and the corners are considerably hollowed out to make room for little pillars. The ivory handles in the drawers are very pretty. The whole of the fronts are filled in with ivory.

All the English furniture we have noticed thus far has one feature in common, that is, ornamented flat surface, the designs of which point to a refined taste in our midst, and artistic talent which will, if cared for and not confined to one particular rut, soon elevate us above the level of our neighbouring nations.

Mr. Thomas Jacobs, one of the artisan reporters on the Paris Exhibition of 1867, exhibits a small table of Amboyna wood. The top is beautifully inlaid with ivory, ebony, and boxwood. We cannot but admire the design of this small article. We hear that he not only designed but made it himself, and has already received some reward for his combined taste and skill.

Cooper and Holt exhibit an excellent piece of oak furniture in mediæval style. Purple wood and ivory form a great part of the ornament. In the back is a large glass, with a smaller one at each side, and above the glass are panels or tiles, with coloured figures on them of an old-fashioned type. Why we should reproduce the quaint and ungainly pictures of our forefathers we cannot tell, but we do so to a great extent in both wood and stone. Here is a fisherman, two gardeners, a woodman, a ploughman, a sower of seed, a shepherd, and an old woman paddling herself along the stream in a little scow. The design is excellent with an excellence peculiarly its own ; it is very angular, and reminds us of when, as boys, we used to cut and carve a square stick with a jack-knife into all kinds of zig-zags and triangles.

Mr. Owen Jones shows some designs for couches, chairs, cabinets, &c., the prevailing feature of which is a combination of different-coloured materials arranged in Oriental style in flat surfaces.

The British show-cases are by far the most beautiful ones in the Exhibition ; perhaps our being a "nation of shopkeepers" has tended to the cultivation of this particular branch of joinery work.

New Zealand

Exhibits an inlaid cabinet made of the different kinds of timber growing in the North Island. The work is very moderate indeed ; there has been an attempt to represent a bird in the panel with veneers : this is badly done. Alongside the cabinet is an inlaid table, with an amount of work in the framing which is totally hid by the top projecting so far over.

The punch-bowl made by the Maories is grotesque enough; the figures are playing mountebank on the lid, and their tongues are protruding as though they were choking for a drink. It is clean cut and well finished.

France.

Immediately outside the French annexe is a model house of three rooms, furnished, and exhibited by France. If John Bunyan's Christian had happened to stumble upon them in his pilgrimage, he would have called one the House of Joy, another the Hall of Melancholy, and the other the Arbour of Repose. All the furniture in the House of Joy is gilt, and has light turned legs. Two side-tables are shaped, one on each side of the room, with marble tops, and on the rails below rest a beautiful vase. The chairs are of an elegant shape, light frames, nearly straight backs, and upholstered with light green material with flowers woven in; a gilt timepiece on the mantel-shelf, candelabra at each side, chandelier all crystal and gold, a long narrow gilt table with rounded ends in middle of room; curtains to window matching chairs, and a gilt cornice; a pretty fender and a beautiful gilt screen. The ceiling is gorgeously enriched and in slight relief. Every appointment of the room has been carefully studied, and it has a very pleasing and heart-warming effect. The Hall of Melancholy is rather a mis-appellation for a dining-room; but we wish to convey the impression it made upon us. Here are a dozen ebony chairs, covered in black and crimson, with small gilt flowers; curtains to match, no cornice, only a valence; an ebony telescope dining-table, ebony cheffonier, pier-glass, screen, &c.; carpet of black-brown and green with griffins all over it; steel chandelier with touches of gold; and heavy panelled ceiling with chocolate ground. Stepping from the House of Joy into this room, the effect is very striking: there all is bright, and warm, and light; here all is heavy, gloomy, cool,—beautiful work, beautiful designs, but the effect was very depressing. The Arbour of Repose is furnished in Moorish style. It contains two sofas without arms, and four chairs,—chairs we must not call them, for there is no framing visible; they seem to be made of two square cushions about 6 inches thick, and placed one above the other, then a similar cushion for the back. The sofa is like them, and all are finished with purple and a little scarlet and blue ornament; carpet of geometric pattern; the ceiling the same; the chandelier is all points. At one end is a fanciful archway, and here are some ferns; a most inviting place of rest for a wearied mortal to recruit his exhausted energies.

The foundation and principal feature of the French ornamental iron work, as shown in the Exhibition, is the spiral. There is nothing in their design to give the idea of strength ; it is all ornament—ornament seems to be the end and aim through all their work ; we do not see any of that angularity so peculiar to our iron ornamentation. Baudrit, of Paris, exhibits some good iron work ; it is impossible for us to do justice to the beauty and gracefulness of some of their designs in writing. There is one specimen of very light work, full of curling tendrils and scrolls ; one of a little heavier metal and bolder design ; one good large pattern of scroll work and acanthus leaf ; and a first-rate specimen of iron and brass, used together—pattresses, flowers, oak leaves, and acorns very tastefully combined, and making a highly ornamental display.

The works at Val de Osne exhibit a number of very interesting bronzes. One is a large fountain ; beneath the canopy stand two females, evidently confiding their secrets one to another, while they empty their vase into the large basin below them. Also a very handsome pair of hall lamps ; the pedestals are ornamented with gilt drapery in festoons and a shield ; on each pedestal there stand two gilt boys dressed in ancient costume ; the lamp is fixed on a light ornamental stem, down which tassels hang carelessly, the boys holding up the whole.

M. Goekler exhibits a bedroom suite, enamelled white with blue lines—it is plain but very neat ; also a very good cabinet in ebony. The upper part of the cabinet is supported by trusses, which gives it a top-heavy appearance, but the work is exceedingly well done. P. Mazaroz exhibits a piece of furniture which is one blaze of gold ; there are figures of boys standing against the upper part, and the front is nearly all occupied by a panel carved in relief ; it is allegorical, and a proper specimen of French taste.

Henri Fourdinois exhibits the best furniture of any in the French Department ; it is first-class both in workmanship and design. The gentleman in charge took from a drawer some specimens of Brevete sculpture, light coloured wood let into wood of a darker shade ; the light wood was carved elegantly and clean, and goes clear through the dark wood. The designs were very pretty.

Goyers Frères exhibit a magnificent pulpit in the Rotunda, executed in Gothic style in oak, and left in the white. The design is beautiful indeed. The long pointed arches, the narrow long panels set so far back, the vertical lights and shades, and the scores of little pinnacles pointing upward and heavenward, appear to us not so much to attract our attention to them, but to arouse in our minds sacred emotions and solemn contemplation of Him who dwells on high.

Monduit, Beckitt, and Co. exhibit part of a church spire covered with lead. The ornaments, mouldings, sashes, gargoyles, &c., are all lead. It would be much cheaper than stone, and looks very well.

The conclusion that we arrive at, after examining their various productions, is, that the French will allow nothing to stand in the way of adornment—directly opposite to the spirit we manifest; if they cannot combine utility with beauty, they will have the latter at the expense of the former. No other nation decorates so much and so extravagantly as they do; coloured woods, ivory, and enamel, metal of all kinds, arms, horses and chariots, shields, scrolls, flowers, birds, and beasts, figures celestial and terrestrial, are all laid under tribute to beautify the work of their hands and gratify the national passion for display.

GERMANY.

Our fireplaces are much more comfortable to sit around, and far pleasanter to look upon than the ugly closed stove, and Germany is successfully emulating us in this matter. I have often thought what ungainly and smudgy looking things our firesides were, the very ugliest part of the whole house; and of all places, the one to which we draw up our easy chairs and stare at all evening long, why this should be the prettiest nook in all the building. There is a good marble mantel and a very ornamental brass stove or fireplace, something to look upon with pleasure, though it is not as good as that exhibited by Yates, Haywood, and Co., of London. It is high time we altered our crude taste in such articles; and if we cannot dispense with them altogether, as many Americans do, let us at least adopt something more pleasing than blacklead and its associations.

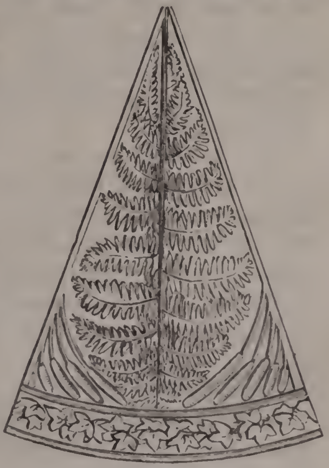
There are clocks of all kinds; some are very good, and some are very bad. There are Gothic clocks, clocks with little soldiers marching round, stair clocks, American, Swiss, and Italian clocks, all made in Germany; but the silliest of all is a clock in a picture frame. Also hundreds of little carved articles, such as paper knives, inkstands, candlesticks, trays, &c., in which the oak-leaf figures prominently. They show an amount of taste and skill in their manufacture.

Some of the cabinets display much taste in design. Where we should fix a plain pilaster, they carve a figure; where we let in a tile, apparently painted 400 years ago, they carve fruit, leaves, or flowers. Here is a very good Gothic cabinet, of very excellent design, with engraved glass panels, thick silvered hinges, escutcheons, &c. With all our pretensions to Gothic, it certainly shames any such that we have seen at home. Also a black ebony cabinet, on which the ornament is profusely heaped. In the lower part three figures do duty for pilasters, and in the panels trophies are carved; the mouldings are all beautifully enriched. Three female figures support the shelf above, and in the panel of the back a stag hunt is carved. The cornice is supported by male figures. This piece of furniture will bear close inspection by workman or artist.

Leigler, of Baden, exhibits an entrance. A male and female caryatides support the cornice; but the work is too flat altogether to look well; and besides, the human figure may be used too much and in the wrong way and place, as it certainly is here.

There are some good specimens of cast-iron work in the German Department. One is a circular staircase; a garden table, with ferns forming the centre and ivy running round for a rim in the top; palisades, &c.

A walk through the Educational Department was especially interesting. There were models, and specimens, and copies for almost every branch of study, drawing, perspective, astronomy, botany, cryptogamy, crystallography, entomology, architecture, &c.



ITALY.

Were I not an *Englishman*, I would willingly be an *Italian.* The Romans were once masters of the world, and they still sway the sceptre in Art. In this department a language is spoken which can be understood by the untutored savage as easily as by the most civilised, telling tales of love, of honour, of victory, of defeat, of trouble and of deliverance therefrom, of bereavement and of resignation. There can be but one opinion of the artistic ability of the Italian. The whole human race is possessed of affections. If men have courage, they have love as well; if they have iron wills, they also have hearts. The Italian gives expression to his feelings continually. With us solidity is the natural state of mind, and we carry this stern solidity too far;

it gets into all our work, it hinders our improvement, it makes us surly and abrupt, and causes our very decoration to be defiantly stiff. The Italian does not allow his feelings to govern him, neither does he smother them, but he allows them to grow and attain their native strength, and thus by them his productions are influenced for much good.

The matchless skill and beauty of a specimen of wood carving I much appreciated. It is a panel carved in relief, about 3 ft. long and 1 ft. wide. The centre figure is a female, her hair streaming in the wind and she standing in a shell; a lovely little cherub, all wings and head, is lightly touching her lips, and clusters of cherubs are hovering round her. The slenderest of stems and leaves emanate from the centre in perfect curves, forming a network regular in outline and charming in design. Here and there those elegant curves dash boldly to the front, magically changing their character into a dragon, not marring, but adding to the effect, like a clear and gentle purling brook suddenly leaping over a rock and transforming itself into a foaming cataract.

The cabinets are of a very bold design. Blue, red, and green stone are much used for inlaying, and very often bold carved figures of unexceptionable outline are introduced. Table tops are frequently inlaid with different coloured marble, representing vases, musical instruments, scrolls, dolphins, birds, angels, fruit and flowers in unlimited profusion.

Here is a very good picture frame. Little nude children are playing amongst the foliage which climbs around it ; it is well cut and left in the white.

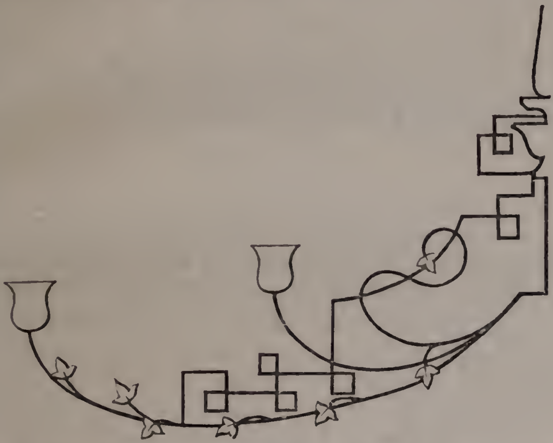
Also some handsome brass bedsteads, cot, and toilet table. The glass on the latter has a beautiful picture on the back of it ; the designs of the bedsteads are in the same style as Birmingham goods, but much more tasteful.

The general upshot of my ideas, after passing through this department, is that Italy is the native hot-bed where all the slips of European Art have germinated ; they have been carried away from home, nurtured and trained in different climes by different nations, sometimes crippled and sometimes overgrown, and in this Exhibition they are once more gathered together, English, French, German, and Swiss, but the loveliest of them all is that which still luxuriates in its native clime.

Belgium.

Here is exhibited a good and substantial looking cabinet in black walnut, with ebony moulds ; there is very little ornamentation about it, nevertheless the design is very good.

Also a very beautiful folding screen in papier-mâché, with a landscape painted on each fold. The scenes are all at the bewitching moonlight or twilight hour, and, with the mother-of-pearl so aptly introduced, have a beautiful effect.



The gas bracket given here I saw at Antwerp, and I was struck with its gracefulness.

SWEDEN AND NORWAY.

In the Exhibition grounds is a beautiful specimen of cast-iron work, in the form of an octagonal pavilion. It is highly ornamental in design. The glass for the windows is engraved, and the little dome is glazed with stained glass. There are also a sofa and chairs in this department made entirely of cane, which seems to be a favourite article for this purpose with them.

HUNGARY

Exhibits a gun-rack made of oak. The principal panel is carved to represent a deer hunt ; in the back are eight carved figures suggestive of the chase, and a squatted hunting dog forms the upright at each side. The design is very appropriate.

Herr Fried Bille shows a very good cabinet ; it is full of internal and external mitres. The upper part is supported by two female lions, leaving an open space of about one foot along the whole length of the top. We notice this peculiarity in many of the cabinets of the Continent, and do not like it, for it suggests to us top-heaviness, and surely this is the opposite of good taste. Had this place been filled up, we think it would vastly have improved the design.

Here are some very good iron bedsteads, all white, and ornamented with flowers. The mattrasses are covered with quilted pink silk with white lace trimmings. They appear very happily adapted for the purpose for which they are made.

Among the villages the Hungarian hut is conspicuous, it has such a clean and comfortable appearance; it is stuccoed all over. The bottom storey is coloured light blue, and the upper storey pink; green Venetian shutters serve the purpose of keeping out the sun, and allowing fresh air to enter; the roof is covered with circular-ended shingles (wooden slates).

SWITZERLAND.

A very fair sample of circular stairs in cast iron. The treads and risers are riveted together; then these are riveted to sheet-iron outside string. On each step are two banisters, one twisted and one straight. The twisted one goes right into the underside of the rail, and when the straight one reaches nearly the top, it bends into a scroll with leaves, forming an ornament all along the underside of the rail.

Close by the annexe is a Swiss house, which gives us an excellent idea of their design in building. A balcony runs all round the house, and the roof projects sufficiently to cover it. Carved and twisted pillars support the wall-plates, and wherever there is a right angle there an ornamental bracket is fixed, cut out in some fanciful manner. The house is built of deals, planed and dowelled together, the ends project, and are gouged out to take away the plainness. Inside the house the risers of the stairs have strips tacked on diagonally across their whole face, and the banisters are cut out with a bow-saw. The architraves and panels of the doors are ornamented with strips of walnut, cut out to patterns, and nailed on, and sometimes they are carved. The work is all extremely rough, but the general effect is very pleasing.

Here are workboxes, knives, forks, spoons, baskets, vases, toilet glasses, barometers, clocks, crosses, chairs, tables, dogs, stags, all in endless variety, and carved out of dark-looking wood. There is a loo-table with a beautifully carved top in slight relief, a very Swiss notion, and quite contrary to our ideas of utility.

Also a carved mantelpiece, with centre stand for timepiece, and a group of birds at each side. The carving is very well done; but no one in their senses would fix a mantel like this in a room, unless cased in with glass, and then its beauty would be departed.

Swiss design does not impress us with any idea of magnificence, or grand and noble effect—they leave that for their mountains to do—but it rather reminds us of their fields, and hedges, and cottages in the mountain nooks, where they live contentedly, and earn their bread by the production of such things as these.

Spain

Exhibits a very good sideboard of dark oak; it is about 8 ft. long and 10 ft. high, and about 2 ft. from back to front. The carved panels and figures are of much lighter wood, which rather mars than enhances the good effect. On one panel is a boy amusing himself with ducks, and on either side of this is a group of birds. In the centre of the back is a youth feeding a bird, which is perched on his shoulder; the lower panels are filled in with carved fruit. The handles to the drawer fronts are very pretty; they consist of two sprigs with leaves intertwining, and bending out a little in the middle to afford hold for the hand.

* * *

Very near this sideboard stands a cottage piano, which, viewed at the distance of three yards, looks like a packing case, with brown paper pasted over it. On closer inspection we find it is carved most elaborately in geometrical arabesque. A more complete waste of labour and a more wretched perversion of taste it was never our lot to behold. In their designs they pitch their pearls to the swine with a vengeance.

Portugal.

Here is a specimen of carving in light coloured wood, a few flowers intertwining about a shield, evidently an exact imitation of nature; extremely fine workmanship, but of no utility.

Also a very beautiful capital for a column. It is scarcely possible for anything to be more ornamental than this is; it is covered with lines and curves and white and gilt foliage on a light blue ground; it arrests and captivates the attention of the passer-by with its acceptable tints and peculiar outline.

Russia

Makes a very poor show. There is a very ordinary fountain made of composition; the roof is supported by composite pillars and the water jets out of the head of a lioness. There are several very rude chairs; they look as though they were painted red, and varnished, and have gaudy flowers on them. The backs of the chairs are set on to the bottom, instead of forming the back leg.

The most remarkable group in this department is a whole suite made out of deers' feet and horns—feet for backs, rails, legs, spindles; they look as though they wanted to trot.

Also a splendid billiard-table, made of heavy moulded green and brown spotted marble, with heavy octagonal marble legs.

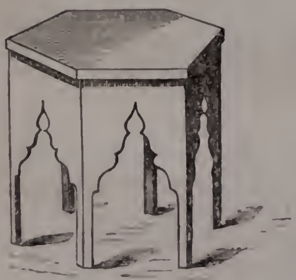
TURKEY.

The religion of the Turk debars him from representing anything which has life in his ornamentation; therefore, if he will decorate, he must confine himself to straight lines, curves, and colour.

There is a good example of his work in a marble centre table; the top is a perfect maze of brown, white, and black curves, abutting and intersecting in all manner of forms, the general confusion thereof combining to form a pattern symmetrical in outline and highly ornamental.

When they attempt to make European furniture they signally fail. Here is a side-table, evidently a copy from a French one with cabriole legs; those legs would shake the nerves of the original maker, did he but see them; but then we must all have a beginning. After getting together they have dosed them with mother-of-pearl, which makes them look ridiculous.

Here are two polygonal tables or stools, standing about 18 inches high, made of black walnut, and almost filled with mother-of-pearl; there are no rails to them, but the legs seem mitred together at the angles, and between each leg is cut out in Oriental fashion.



The designs of some of their productions possess a peculiar beauty, and point clearly to the faith they hold; but in some we fail to see either use or ornament.

EGYPT.

There cannot be a greater difference visible in anything than is shown in the designs of the ancient and modern Egyptians. The monolithic and sepulchral style of the Pharaohs, the crocodile, the beetle, and the water-lily, and the hieroglyphic writing which covered their walls, all belong to ages long since passed away; and in their place we find the dome, the minaret, the crescent, and the unscientific arch and coloured embellishments of the Mussulman.

There are two ebony cabinets here shown, very Moorish in style, with ivory and mother-of-pearl inlaid over their whole surface. The centre is a cupboard, and at each side is a niche overhung by a cusped arch; the frieze at the top is filled with rows of cusps, and the panels of the doors below are filled in with arabesque on a gilt ground.

There are a pair of doors, left in the white, which at a distance look very plain. They are filled with arabesque carving. This peculiar style of ornament requires colour to give it any effect.

The large Egyptian building standing nearly opposite the Rotunda is a splendid specimen of Moorish architecture. It is particularly conspicuous by its alternate lines of chocolate and buff stringing encircling the whole building. The archways and window openings are extravagantly full of ornament; and in the loftiest portion are five highly decorated towers, one apparently built on the other, and each one decreasing in diameter and height until the top is reached. The inside of the building is gorgeous and delightfully cool; not a single representation of a leaf, flower, fruit, or animal of any kind is to be seen; nevertheless the delightful arrangement of the different colours and geometrical forms of the same unite to produce a gorgeous display.

Roumania.

In furniture the Roumanians display a very rude taste. The timber of the chairs and sofa here exhibited is all about $1\frac{1}{4}$ inches square; the legs, arms, and back are all straight, and covered with scarlet, then webbed over the scarlet with something like carpet binding. About every four inches apart is suspended a little coloured wooden ball, hanging like a tassel.

There are two models of buildings which are very ornamental, and are very Oriental in character.

Among the villages in the outer grounds the Roumanian hut was, perhaps, the very rudest; but, in strange contrast, the archway over the entrance to the garden was filled with Moorish ornamentation. The agricultural implements and cart in the corner of the yard were exceedingly primitive in type.

Persia.

They exhibit a table about 6 feet long by about 3 feet 6 inches wide, and standing on legs halved together and braced by a rail underneath, which goes through the halving, and is made firm by a key-wedge. It is miserably constructed, and is covered with red, green, yellow, black, and brass dots for ornament.

There is a bedstead to match the above. It stands about 1 foot high, with a rail running completely round it, and a gate at one side to go to bed through. The legs have a triangular block nailed on them at the bottom, and another at the top, for strength's sake; and on each post, right at the top, the paper photograph of a European girl is stuck on with gum.

JAPAN.

In this department stands, very conspicuous, a huge gong—a Japanese big drum. Whether they use it to call their gods to attention, or whether it is for some more civilised purpose, we know not. It stands about 16 feet high, and is about 9 feet square at the base; three steps lead up to the platform and the gong, and this is surmounted by a large screen covered with Japanese lines of beauty, and climbing up each side of which are two dragons, many-winged and many-clawed, and looking like demoniacs at each other. There is a hand-rail running round the platform, with a purple screen behind it; every joint of the framing is brass bound, and the brass engraved.

There are several models of houses, most of which are quite open at the bottom, with a light palisading or network of bamboo running from post to post; the object of this will be to receive as much of the cool air as possible. The lines of the eaves have many irregular curves in them, which adds considerably to their picturesqueness. They are thatched or shingled, and bamboos are then nailed diagonally upon them. Some have paper windows. Their houses, furniture, clothing, pictures, are all possessed of the same irregular outline, and they are not without beauty.

They have been trying their hands at a chest of drawers and cupboard, but they will not pass muster.

There is a very fair dining-room suite in frame, but we have a strong suspicion that they have been put together by a European, if not an Englishman, and the carved part only executed by them.

They are a long way behind in many points, and yet they are worth imitation in some points, and may be studied with profit.

CHINA.

Here is the most extraordinary bedstead we ever clapped our eyes upon. It has four long posts, and the stocks are about 6 inches wide and 1 foot high. The mattress is about twelve inches thick, and moulded like an ogee on the sides. The width of the bedstead is considerably more at the head and foot than it is in the middle—the inference being that Johnny reposes with arms and legs outstretched. The posts are about two and a half inches square, and the corners nicely rounded off; at about 6 inches from these are smaller posts, about one and a quarter inch in diameter. The cornice is 9 inches deep and beautifully carved. Very light carved work also answers the purpose of curtains, and sweeps from the top at the centre of the sides to about halfway down the posts. The character of their carving is peculiar, very minute at times, and very well finished.

Also a toilet-stand, with ebony top, and three frightful dragons lashing themselves around the pillar. There is another with a quaint picture on the top, representing a procession of grasshoppers: six of them are carrying one of their brethren in a sedan chair—and very solemn they look over their job; another has his work set to lug along a flower and keep it perpendicular; six more are marching along in state, &c. The whole, probably, refers to some national fable.

One piece of furniture very much resembles our canterburies; the shelves are surrounded with curious carved work, and fearfully Plutonic little figures are scrambling round the pillars.

There is also a grim old specimen like a side-table; the two front legs are figures, the faces of which are just discernible.

Woollen Carding.

By TOM LISTER (*Carder at Messrs. John Schofield and Sons.*)

THE Society for the Promotion of Scientific Industry having done me the honour to send me to the Vienna Exhibition to report on Woollen Carding, I will endeavour to make a fair and unprejudiced comparison of the various exhibits employed in that industry. In my opinion the Society have done well to include the woollen industry in their programme, as there is such an incredible difference in the system of working on the Continent and in England. This must be understood to apply to clean wool and clean waste only. It is time the British manufacturers awoke out of the trance in which, as a body, they have been for so long reposing, in the thought they could not, and never would, be beaten. When we take into consideration the large quantity of yarn sent into our own markets, particularly to Glasgow, from the Continent, which will amount to between twenty and thirty millions of lbs. of yarn per annum, and assuming that the average per lb. will be 2s., it will amount in the aggregate to between two and three millions sterling. With these facts before us, would it not be well to look around and see if we cannot find where we in England are so effectually beaten. I will now attempt to describe the machinery exhibited, which, without exception, was on the Continental system—that is, small three-single-cylindered machines, from 40 to 50 inches wide, clothed with hard, or Belgian, cards. The English style of large machine, 60 to 72 inches wide, and clothed with soft sheet cards, was entirely unrepresented.

Scouring and Preparation of the Raw Material.

The first special feature is the very great care taken in freeing the wool from grease, burrs, seeds, &c. Wool scouring was well represented by Messrs. McNaught's, of Rochdale, well-known machine, which is of great advantage compared with the old and slow process of hand-washing. The wool is then dried and willowed ready for burring, for which a very efficient machine is exhibited by M. Celestin Martin, Verviers, Belgium.

Burring Machine.

The principal novelty in this exhibit is the burr cylinder, the diameter of which is about 24 inches, covered on the surface with thick-teethed bars, similar to doffing-plates, which are ground to the surface, admitting of very close setting of the burr roller. Between, and from the roots of each tooth, grooves are cut about $\frac{1}{16}$ of an inch deep and broad to run out at the back in the direction of the circumference. The points of each succeeding row of teeth are brought immediately opposite the grooves. The effect of this arrangement is, the wool being caught by the teeth falls in the grooves, which are too small to admit the burrs and other hard matter ; consequently, the burrs being on the surface are very readily knocked off with very little wool attached.

Oiling and Fearnoughting, or Plucking.

For these purposes M. Martin exhibits machinery. This process of oiling is far in advance of the English system of putting the wool on the floor in layers, or beds, and sprinkling on the liquid with an ordinary watering can, when the blend is run through the plucker, and sometimes the willow, thereby losing a large percentage of oil. This oiler distributes the oil on the material as it passes finally along the lattice feed-sheet of the plucker. The machine has two cans, quarter circle in shape—one for oil, and one for water—having a spout at the bottom of the straight side. The cans are placed above and across the feed, and are tilted by means of a rack and cog-wheels. The liquid when released runs into a gutter with niches cut one inch apart across the feed. A quick revolving brush, about 12 inches diameter, sprinkles the oil in a gentle spray on the wool as it passes along the lattice on the feed-rollers. When the machine is stopped, or running without wool, by simply tilting back the cans the flow is stopped. Should an oil containing sediment be used, it would be liable to make up the niches, and so prevent its proper working.

Carding machinery—Platt, Brother, and Co. (Oldham), 1 set.—This set consists of three single-cylinder engines, or breaker, clearer, and condenser, all of one width, 50 inches. Each part comprises one cylinder, 50 inches diameter; five workers, each 8 inches diameter; five strippers, each $3\frac{1}{2}$ inches diameter; one angle stripper, 6 inches diameter; one fancy, 12 inches diameter; doffer, 30 inches. The doffer is stripped with a vibrating or fly comb, and under each fancy is placed a small roller, covered with card, to prevent an excess of fly being thrown out. All the parts are made of iron, perfectly true. The fixings or bearings are of their well-known pattern, which admits of the greatest nicety in setting, and are well adapted for this method of carding. The condensing machine is on the principle of M. Martin's patent, dispensing with the usual doffer covering of separate card rings or ribbons, this covering being a continuous fillet wound on spirally, stripped or doffed with a fly comb. The web then passes between two rollers, about 9 inches diameter; the surface of each roller is divided into alternate ridges and grooves of equal width, and also provided with a series of endless leather bands of the width of the fleece intended to form one thread or sliver. The rollers are so set that the elevation, with the strap around, of one roller will press into the groove of the other, enabling each groove to take its proper share of web. The straps on one roller pass upwards, and those on the other pass downwards, thereby separating or tearing the web into as many threads as there are straps. These flat slivers are then taken from the straps by small discs, the upper half carried forward to the top pair of rubbers, and the lower to the bottom pair, where they are rubbed into threads; each pair of rubbers filling two bobbins or spools, turning off two waste and eighty good threads, giving twenty to each of the four bobbins.

FEEDING.

The wool is weighed on to the scribbler-feeder by hand, the web from the doffer is twisted into a rope sliver, and passes into the balling machine, which makes a roll or ball with two flat sides. In front of the clearer is a creel in which are placed sixty-eight of these balls, threaded through a rack of as many holes. This is a good feed for mixing and producing even work on the clearer, but is not suitable for small parcels or for condenser feeding, where broken slivers would cause uneven threads.

The condenser is fed with rolls or bats, on the principle patented by Mr. David Horsfall, Huddersfield. It consists of an endless lattice apron, hinged at one end, so as to be capable of oscillating. At the other end of this is hinged a pair of oscillating lattice sheets, parallel to each other, both travelling together, balanced from the fulcrum by a weight passing over a pulley in the ceiling.

The wool is received as stripped from the doffer on to the endless lattice apron, and carried forward between the pair of oscillating and travelling creeper-sheets fixed on a carriage, and by their traversing and rotary motion they deliver it on to a cross-creeper in folds or layers one upon another, forming a bat of suitable width to the width of cards on the engine intended to be fed. This creeper again delivers the bat to a roller or bobbin, upon which it is wound by surface rollers turned by a latch motion, or the patentee's adaptation of a positive worm motion, which is not so liable to vary as the latch in its rate of turning.

This is an excellent machine, requiring little attention, and taking up considerably less room than other bat-feeds with the same amount of mixing and crossing of the material; and it also enables the two engines to work independently of each other.

The strippers, fancy, and workers are turned, Continental fashion, outside the bends, a very desirable arrangement where Belgian cards are used, as it enables the fancy to be well covered in, and preventing any side draughts, or the chains tightening by an accumulation of wool, and so drawing the rollers into the cylinder; and more particularly in cases of straps breaking there is less danger of damaging the cards.

This set was carding Buenos Ayres wool for 18's Scotch yarn condensed to 18 yards to the dram, and spun direct from the bobbins to the required length, turning out about 110 lbs. per day, thus dispensing with and saving the cost of the intermediate process of roving.

This condenser does its work very well, and is specially arranged for making small yarns. Experience alone will determine how far it can be applied to the production of coarse or thick yarns. In my opinion, a fillet-doffer having the teeth cut out or depressed to form spaces and filled up with leather or lead dividers, thus producing more uniform rings than if made in separate ribbons (on which the evenness of the work depends), would be more suitable for the general trade of this country.

M. Martin's set for fine work.—This set consists of three single cylinder engines. The breaker comprises 1 licker-in 10 inches diameter, with burr roller, 1 small breast 10 inches diameter, with 2 workers and strippers 3 inches diameter, clothed with flat wire or Garnett tooth-cards. Cylinder 44 inches diameter, 8 workers 7 inches diameter, 8 strippers 2½ inches diameter, 1 angle stripper 6 inches diameter, 1 fancy 15 inches diameter, 1 doffer 16 inches diameter, stripped with a fly comb.

The intermediate and condenser carder are of the same dimensions as the breaker, but without the breast. All parts made of iron. The roller bearings are of flat shape, with a square hole to assist the sight in setting. They are put through grooves in the bends, and the side adjusting screws are placed above the top of the bends, and in the way of easy setting. The strippers and fancy are turned outside. The worker chains inside pass over, and are kept clean by a fixture brush.

The condensing machine is on the same principle as that fitted to Messrs. Platt's exhibit, with the exception of turning off 120 threads in place of their 96.

The breaker is fed by a machine consisting of a box or hopper (placed in front), and will hold from 20 to 30 lbs. of wool. Inside this box is a leather sheet inclined towards the engine, on which are placed iron hooks about 2 inches apart. Over the top of the sheet is a roller, with strong straight teeth the same distance apart, revolving at the rate of 12 revolutions per minute, acting as a worker in spreading the wool, which is then passed on to the feed rollers by a fan. This is a very simple arrangement, and lays on the wool far evener than by hand.

The sliver from the doffer is wound on to a blanket feed or endless sheet, passing over and around a series of rollers. After a certain number of revolutions, a bell rings, intimating to the minder that the web is the required thickness, who then breaks it across, and it is weighed on the intermediate by hand. The same kind of feeder supplies the condenser, excepting that the web, when broken across, is wound on a roller, and placed on the feeder the same way as it is turned off the intermediate, not attaining that desirable crossing of the web as shown in Messrs. Platt's exhibit.

M. Martin's set for coarse work.—This set comprises two single-cylinder engines, each part having five workers, of the same dimensions as the set just described, and having the same condensing machine turning off 60 good threads. In these two sets, to prevent dirt and fly accumulating in the necks of the bearings, the roller shafts work in a loose boss about 2 inches long, having a small lubricating cup on the top, and underneath the boss is a small hole to admit a pin fixed on the bearing to keep it in position.

M. Sechs, of Chemnitz, Deutsche Rein.—This set also comprises three single cylinder engines, 44 inches wide. The condenser doffer, 24 inches diameter, is covered with separate ring cards stripped by a fly comb, having a single rubber machine filling only one bobbin of 30 good threads, the waste or end slivers being stripped with a fly comb on to the floor without passing through the rubbers, thus preventing in some degree the frequent breaking of one or two threads near the waste slivers. Between each ring on this doffer is a space three-eighths of an inch wide filled in with leather bands. Underneath the cylinder is placed a quickly traversing worker and a stripper to spread the wool left by the divisions in the doffer. The breaker of this set is fed by J. H. King and Co.'s, St. James' Works, Kenning Park, Glasgow, patent hopper feed; and it seems to answer very well for the fine class of work here carded. The sliver from the breaker is twisted into a rope and passed by Apperly's diagonal feed to the following part. The condenser is then fed by a blanket feed. The bearings have a flat plate or lid to prevent dirt getting into the necks. These workers, strippers, and fancys are also turned outside the bends.

CARDS.

The fillet cards on all these machines, which are used to such advantage by the Continental manufacturers, are the Belgian or hard cards. The wire is set in a strong foundation of leather, or seven ply of cotton cloth, cemented together with a solution of rubber, and filled up to the bend of the card tooth with a woollen felt. The bend of the tooth is so arranged as not to hook the wool, and, should it be overpowered, will sink under rather than rise, and make a prickle, a fruitful source of noppy yarn.

These cards are much finer in counts and wire than ordinary English cards. The breaker cylinder is clothed with 22's, or 11 crowns, 110 counts, 32 wire; doffer and workers, 24's, or 12 crowns, 120 counts, 33 wire; the strippers on every part are clothed with undercut diamond point, 6 crowns, the point of teeth rising about one-eighth of an inch above the foundation. The fancy, with sheets, 7 crowns, 70 counts, 32 wire, 2¼ inches cut; the tooth is bent so as to bring the point very forward, so that the contact with the cylinder will be rather at the back than at the point of the tooth, which prevents an excess of fly. The intermediate cylinder is 24's, or 12 crowns, 120 counts, 34 wire; doffer and workers, 26's, or 13 crowns, 130 counts, 35 wire; fancy 8 crowns, 80 counts, 34 wire; condenser cylinder, 26's, or 13 crowns, 130 counts, 35 wire; doffer and workers, 28's, 14 crowns, 140 counts, 36 wire; fancy, 8 crowns, 80 counts, 35 wire.

The lapping of card-fillet.—These cards require to be lapped on very tight, and before grinding every fallen tooth requires putting into position.

GRINDING.

For grinding workers and strippers, M. Martin has an excellent exhibit, arranged so as to grind a needle point on the card. It consists of two discs, or face plates, rotating and traversing across the frame, the card roller revolving at a quick pace; the abrasion on the wire by these discs grinds a needle point instead of a chisel or flat point. The traversing strickle exhibited by Messrs. Platt is also a very useful and good arrangement for grinding perfectly true, and can readily be applied on the cylinders and doffers. Should these cards at first or afterwards be ground too hastily, or with too much pressure, serious and irremediable injury is done, as the point of the tooth once brought forward, it is never got back to its place again. If they are properly put on and ground, they are, in effect, as true and level as an iron roller turned in a lathe, and have nothing to prevent them from being set with mathematical precision; they will work so close as only to admit a flat piece of steel of the thickness of 34-wire gauge between cylinder, workers, and doffers, and with this precise setting it is impossible for a lock of wool to escape being worked.

CLEANING OR FETTLING THE CARDS.

In cleaning, the comb-fettler must not be used by any means, but a soft sheet card of particular form of tooth, nailed on to a hand board similar to those used by cloth finishers in hand raising. The cards, being of such a very delicate nature, would soon be knocked down and spoilt by the comb-fettler, as anything of a stronger substance passing between the teeth will lay them down, as they do not possess the same elasticity as a soft card. At each cleaning the workers are taken to the grinding frame and ground with a light hand emery strickle, for about 10 minutes each. With straps, &c., the cylinder and doffer can readily be reversed and ground a half-hour each. Thus always keeping a regular working point.

That the British manufacturers are far behind the Belgians and other Continental firms in the production of fine wool yarns suitable for making flannels, shawls, some kinds of fine cloths, and goods suitable for the making of female attire, is very evident, from the published and well known statistics of their large trade in Scotch yarns, having beaten the home firms almost out of the markets; of course, this does not apply to those isolated manufacturers here who have successfully applied this system. It seems to rest in some persons' minds that the wages question enters largely into this matter; but I can affirm from actual inquiries on the spot that it has very little or nothing to do with it, as the following example will show. In their works where they employ three women at 6s. each per week, we have two at 10s. each, and here three men at 20s. each per week against their five men at 12s. per week, and so on through other departments; from this it is evident that wages do not make the difference. Whilst our manufacturers have been increasing the width of machines, and so making them more ponderous and to require a great amount of power to turn, the Continentalists have stuck to their narrow machines, which in no case exceed 50 inches on the wire iron cylinder, turned perfectly true, clothed with a card that will stand up to its work, and allow of being kept sharp at the point, and perfectly level on the surface, thus admitting of fine and close setting without actual contact of the teeth in any part of the machine, excepting the fancy. The rollers being narrow and of light weight, are removed to the grinding frame to go through their periodical process of strickling, and replaced in the engine in the shortest possible time.

The reason these narrow machines are preferred to the larger, is that they have found them to answer their purpose so well. They cannot be surpassed or equalled, either in the quantity or quality of work turned off, besides taking less room, less money to purchase, fewer cards, and less power to turn the machines.

Should the English manufacturer adopt the system here commented upon for his own mill, he would then have taken the first and most important step towards reducing the successful competition of his foreign rivals.

Paper Manufacture.

By ALBERT E. REED.

PAPER MANUFACTURE, as represented at the Vienna Exhibition, is the subject on which I have the honour to report. In making the necessary investigations for this I have considered it my duty not only to examine and compare the specimens of paper from the different countries, but also to make a careful scrutiny of the paper-making machinery and appliances.

To make my Report as intelligible as possible, I propose to describe—first, the exhibits of paper machinery; next, the paper productions of the different countries represented; and then, from these, to make some comparisons and deductions.

The expectations which a paper-maker forms on first entering the spacious and well-filled machinery hall of finding a good collection of paper-making machinery are soon disappointed. Whilst ponderous locomotives are counted by the dozen, and stationary steam-engines by the score; whilst machinery for spinning and weaving, and other trades, appears in profusion, the paper-maker finds the exhibits in his trade are few and mostly unimportant. Seeing that the machinery employed in his manufacture is so varied, and that scope for improvements is so considerable, he cannot but feel disappointed, and perhaps a little jealous of better represented trades.

Our own country is one of the principal defaulters. Great Britain supplies paper machinery in considerable quantity to all parts of Europe—indeed, to all parts of the world; yet the entire display in the British Section consists of two revolving strainers and an old model of a paper machine. America, the largest maker and largest consumer of paper in the world, with all her inventive genius, sends not a single specimen of her skill in appliances for paper-making. France has two exhibitors; Switzerland also two; Würtemberg three; and Prussia (including Bavaria) three; and that completes the list. Austria herself has nothing to show, so that if she has any interest in this matter at all it is a desire to be benefited, and not to benefit other countries by her own Exhibition. Of Russia it may perhaps be thought characteristic, that, whilst vying with other countries in big things, such as locomotives and monster guns, she exhibits no machinery for the peaceful art of paper-making. In course of time, it is hoped, the balance of importance between gun-making and paper-making will be more evenly adjusted.

In reference to the exhibits above enumerated, the most interesting facts to notice are—first, that Switzerland and Prussia each send a paper-making machine, and next the especial attention paid to revolving knotters (or strainers), Great Britain and Würtemberg each exhibiting two. These demand our special notice. For the other exhibits of paper-making a few words will suffice.

Both paper machines—Swiss and Prussian—are clumsy in arrangement, badly proportioned, and indifferently finished, reflecting credit on neither designer nor workman. If these represent their best achievements, those paper-makers who are working their inferior machines deserve much commiseration. Probably the exhibitors rely on the heavy build and somewhat imposing appearance of their machines to obtain for them a good reputation. Heavy they are indeed—in many parts needlessly so; but whilst there is a waste of metal in some places, in other parts there is a deficiency.

The machine of Escher, Wyss, and Co., Zurich, is of a moderate width, and will make about 75 inches of paper. It should here be noted that all dimensions given are merely estimates, as measuring was not permitted. Commencing at the head of the machine, we find a peculiarly-constructed sand-trap. Usually the cross-bars are placed obliquely to the floor of the sand-trap, inclined against the flow of the "stuff," acute angles being thus formed, which readily retain the sand that becomes precipitated. In this machine the cross-bars are placed obliquely, but inclined with the floor of the stuffs, making obtuse angles for the pulp to strike against, which obviously cannot retain the sand so well as the usual method. In connection with this it is interesting to note that the model exhibited by Donkin and Co., and which previously did duty in London, has singularly enough this same peculiarity. The knotters are of the plain flat kind, three in number, each about 6 feet by 2 feet, and placed on a level, copper tubes being provided to divide the pulp between them. The modern practice of placing the cam-shaft below the knotters is adopted; the driving pulleys are also underneath—altogether a good arrangement for cleanliness. The trough between the knotters and wire is very shallow. A mixing-box, with agitator, which is fixed between the sand-trap and knotters, would be more serviceable, if placed here. The wire-frame has the merit of being long, but the advantage of this to the paper is to a great extent lost, owing to the space occupied by the vacuum-boxes, which is over 5 feet, being about double the space usually allotted. In modern machines generally two boxes are fixed, about 9 inches wide, with a foot space between them, and this is found sufficient. Here, there are three boxes, each 13 inches wide, with 12 inches space between them. The edges are covered with brass strips, which are crooked and roughly screwed on, presenting a hard uneven surface to the wire. It will be evident that this great length of suction, and the excessive friction from the roughly-fitted brass tops, will combine to subject the wire to unnecessary wear, whereby its life will be very materially shortened. The breast roll is of copper, and about 9 inches diameter. Between this and the first vacuum-box there are thirty-one copper tubes. These are 2½ inches diameter, and the journals bear on independent adjustable brasses, which are unaccountably thin. The first twenty-four tubes are placed 3 inches from centre to centre; here 2-inch tubes would have been an ample size. The couch rolls also are copper, each 12 inches in diameter. For the top coucher a wooden roll of 16 inches diameter, and for the bottom a copper, or brass, roll of 10 inches diameter would be more effective. On the top roll, the guard board is fixed low down, and between it and the rinse pipe there is a hard brush. Evidently some Continental paper-makers have found couching a difficult operation. The guide roll and stretch roll are only 4 inches diameter. This is not large enough, as they are subjected to a ten times greater strain than any of the twenty-four 2½ inch tubes. This is only one instance amongst many of striking disproportion. The Deckle frame is of brass, well made, and conveniently arranged for shifting. The arrangement of water pipes is also convenient. The shake motion is given through a bar standing about 12 inches perpendicular to the shake frame. The motion would be steadier with the horizontal shake bar attached direct to the end of the frame.

Passing on to the wet felt frame, we find a convenient arrangement for drawing the air from under the paper, immediately before the first press rolls, where it is so often a source of trouble to the machine-man. The rolls working under the wet felt are all copper and rather heavy. There are seven drying cylinders, each about 3 feet 6 inches diameter. Immediately following the cylinders, instead of plain rolls for leading the felt, there are small cylinders (about 15 inches diameter) with steam supply to them, which serve the double purpose of leading the felt and drying it. By this arrangement the duration of the felt is increased. The stretching tackle of the felt is peculiarly clumsy; a worm and wormwheel, rack and pinion, all of coarse pitch, being employed to do what would be better accomplished by an inch screw and nut. The framing of the machine is heavy and inconvenient. There is one stack of three large calender rolls, and then we reach the reeling apparatus. Doctor blades are fixed, not only on the top press rolls, but also on the first bottom press rolls, and on all the cylinders and calenders. In this they are unusually extravagant, seeing that they are expensive appendages, not only in first cost, but also in power to overcome the friction they produce. English makers are generally content with doctors on the top press rolls and the first three or four cylinders.

Looking at what may be regarded as novelties in the machine, viz., its extra vacuum surface, the brush on the top couch roll, and extra doctors, it would appear that Continental makers have some peculiarity in their pulp inducing these additions. The extra vacuum-box suggests that their pulp, as supplied to the machine, parts with its water through the wire reluctantly, or, to use a technical phrase, that they work "wet stuff." This might result from the special properties of the fibres employed, from the special mode of preparation in boiling and bleaching, or from beating the stuff in the rag engines a longer time than is common with us; by this (latter) means the paper is improved in appearance, but is made soft and weak. The brush, on couch-roll, and the extra doctor blades, suggest that they have something in their pulp which freely escapes from the surface of the paper and adheres to the rolls and cylinders. The secret, perhaps, is the too liberal use of that friend of paper-makers in these cutting times, china clay.

The machine exhibited by G. Sigl, of Berlin, is about the same size, and is in its general features very similar to the one just described. Like it, it has plain flat knotters, with very irregularly cut plates; but there are only two in this machine, one being placed above the other. The wet end is better proportioned and arranged than in the Swiss machine, excepting that the breast roll is much too small, being only 7 inches diameter. The tubes following the breast roll are 2 inches, and immediately preceding the first vacuum-box they are 2½. There are two vacuum-boxes arranged for water suction. The top couch roll is 14 inches, the bottom 9 inches, a good proportion. From the guide roll, which is only 4 inches diameter, to the couch rolls there is a fall of about 7 inches. All the rolls of the wet end are copper. The press rolls, both pairs, are 14 inches diameter. Here there is a great waste of metal, and worse than waste, for a 10-inch or 11-inch roll at most would have been large enough to ensure freedom from springing, and allow an easier escape of the water pressed through the felt. The doctor on the top first press roll is made to travel slowly to and fro; this is a very sensible arrangement for preventing either the roll or doctor blade wearing in grooves, and keeps the press roll much brighter than fixed doctors. Although so reasonable a plan, I have only seen two machines in Britain that have this arrangement. There are only five drying cylinders, four of them 4 feet and the other 3 feet diameter; on three of them heavy iron surfacing rolls are placed. Doctors are fixed to all the cylinders, and also to the calenders, of which there are three rolls in one stack. The felt rolls throughout the machine are copper, about 5 inches diameter. I see no reason for this profusion of copper. I think copper shells will be more likely to get warped by extreme variations of temperature than iron rolls. The same clumsy arrangement for stretching the felts is employed as in the Swiss machine; this is an elaborately cumbersome way of effecting a simple movement. The framing is heavy, ugly, and inconvenient. The circular slotter framing which has been adopted in England for some years past is lighter, stronger, and the most convenient that can be made, and it is surprising it has not been copied on the Continent, unless they fear the expense of new patterns. Another antiquated notion is that the machine is constructed for the paper to be reeled on skeleton drums, and then to be cut off by hand, involving extra labour and waste, although cutting machines date forty years back and have attained to great perfection. The driving motion is complicated; too many belts are used. The evil of this, however, is partially counteracted by the use of flat expansion pulleys, which offer great facilities for accurately adjusting the speeds.

Viewing the two machines in connection, it is difficult to decide which should be preferred. Both betray absence of originality, and are behind the times. What special features of merit, other than the minor details I have mentioned, their makers claim them to possess, I cannot discover, and they have not even the redeeming quality of good workmanship.

Turning now to the revolving strainers, we are glad to find novelties. It is well that special attention has been given to this subject, as there can be little doubt that eventually some form of revolving strainer will supersede the flat jog knotters in general use. No adjunct of the paper machine is more troublesome, and although many schemes for separating knots, strings, and dirt from the pulp have been well devised, they have generally proved in practice unsatisfactory.

The two revolving strainers from Würtemberg are on the same principle, which consists in an ingenious combination of jog and revolving motions. That exhibited by Christopher Wandel is the better in detail of the two. These strainers are cylindrical in shape, and have large hollow brass journals, which bear in cast-iron carriages bored to receive them. An arm attached to the cast-iron carriage gives the jog motion to the strainer derived from the cams. The strainer by Christopher Steinmeyer revolves once to every 16 revolutions of the cam shaft, and Wandel's once to 6½ revolutions of the cam shaft. In both cases the plates appear too weak to endure the wear and tear of the jog motion, especially the former, in which the slits are very badly cut, some being double the width of others. The pulp being supplied to the inside of the strainer is constantly on the move. A rinse pipe fixed over Wandel's strainer is a convenient method of keeping the plates clean, which cannot be obtained in flat strainers. With more substantial workmanship this may be considered a decided advance on flat knotters.

The revolving strainers from British exhibitors are constructed on different principles. That of H. Watson, Newcastle-on-Tyne, is sexagon, but is unfortunately so placed that its method of working cannot be seen. I presume it is worked by a bellows inside it. The plates of the strainer are beautifully and evenly cut, and are well put together.

The strainer exhibited by James Bertram and Son, of Edinburgh, is of recent invention, and well deserving attention. It is four-sided, each side measuring about 6 feet by 2 feet. The bellows, which has hitherto been the principal difficulty with revolving strainers, is dispensed with, and the necessary suction is obtained by a pump fixed outside the strainer. This pump has a 13-in. plunger and an inch stroke, and makes 200 strokes per minute. It will be obvious that at every stroke of the pump a regular quantity of pulp is drawn through the finely slit plates, and ejected through a pipe at the opposite end of the strainer from that to which the pump is fixed. It is exhibited working with water, and revolves six times per minute within a large fixed vat to which the pulp is supplied. A special advantage of this strainer is the regularity with which it delivers stuff to the paper machine. The pump is more certain in its work than a bellows, and there is the additional advantage of having the working parts in sight. If this strainer had the addition of some arrangement for removing regularly the dirt that is retained in the vat, it would leave little to be desired by the most exacting of paper-makers. The workmanship is good. It is pleasing to observe that in this section the British exhibitors have maintained their reputation for substantial work and good finish.

Only two or three less important paper-machinery exhibits remain to be noticed. Two leading engines of Prussian manufacture possess no new features, but show manifest want of care in design. In the rag engine, which is fitted with a roll and plate, the latter projects 2 inches on each side beyond the sweep of the roll, nearly 4 inches of plate surface being thus wasted. The old-fashioned style of having the roll to lift only at one end is retained, and the still more antiquated plan of using a worm wheel and its accompaniments for lifting the roll, whereas a screw and nut would serve the purpose much better.

The French exhibit consists of a flat knotter, a brass-jacketed press roll, and an iron calender roll, which are all specimens of excellent workmanship and splendid finish, but possess no novel features. A complete paper machine in this style of work would have been a refreshing sight.

A drawing of a paper machine, shown by Zuppenger, of Würtemberg, was hung too high to obtain details ; but when it is observed that although there are only 5 drying cylinders, yet 13 pairs of bevel and mitre wheels, and 17 pairs of pulleys with straps, besides spur gear, are shown for the driving motion, it will be at once seen that no benefit could have been derived by an exhibit of a complete machine with corresponding complication. The drawing might be usefully employed in teaching future designers what to avoid.

A small model of a paper machine sent by Donkin and Co., of London, is probably intended to show, not how machines *should* be made, but how they *were* made a few years ago.

Lespremont's (of Paris) model of a patent pulp-washer is more of a novelty. It is an ingenious apparatus for washing esparto and straw pulp with less water than is used by drum-washers in common use. It appears to be a very elaborate arrangement for performing a simple operation. I fear, however, this must be regarded as a waste of talent, as a patented invention of mine has shown that washing such pulp is altogether unnecessary ; so the cost of such apparatus may be spared.

Gebrüder, Decker, and Co., of Würtemberg, exhibit a circular revolving boiler for straw and esparto, strongly made, suitable for high-pressure boiling, but possessing no new features that I could discover.

This completes the exhibits of paper-making machinery, and cannot be considered a fair representation of so important a branch of industry.

Leaving the Machinery Department, and entering the Great Industrial Hall, we find numerous specimens of paper-making appliances, as dandy rolls, machine wires, felts, &c. These are found in various parts of the building, and the wires and dandy rolls especially are uniformly good. The wires from one of the Austrian exhibitors specially deserve examination. In addition to ordinary machine wires, there are wires for cigarette paper of very fine mesh, and beautifully woven; also, a wire from a white metal, which is a novelty; and if it is more durable than the ordinary brass wires, will supply a real want. The specimens of French and Russian lettering in wove and laid were excellent, as also the laid dandy rolls. The felts are mostly coarse, but, probably, stronger than we get at home. Some extra stout jacketing comes from Switzerland; also some coarse strong wet felts, which are finished on one side only. In appliances of this sort, the Continental paper-makers are clearly at least as well supplied as English makers.

The samples of manufactured paper now claim our attention. Taking the Annexes and Courts in their numerical order would, with one or two exceptions, be following a descending scale. The ascending scale—progression—is preferable. We, therefore, begin with the specimens from those countries most remote from the advantages of mechanical appliances.

Commencing with Japan, in the extreme North-Eastern Annexe (No. 16 B), we find a small parcel of, perhaps, the most remarkable paper in the whole Exhibition. This is made from the native *Broussonetia Papyrifera*. How the Japanese make this paper does not appear; but the result of the accumulated experience of hundreds of years is the production of a delicate, silky, tenacious tissue, unequalled, in these respects, in the Exhibition. Close by is a collection of magnificent fibres, sufficient to excite the envy of hungry, fibre-hunting Englishmen.

On the opposite side of this Annexe are some Chinese papers. These are mostly of a dirty colour, and have nothing to recommend them but their tenacity. Other papers for decorative purposes are elaborately coloured, and figured in grotesque designs. These display skill in the preparation of the paper to make them receive the impressions and colours so clearly. In the adjoining Court are samples illustrating the manufacture of the Chinese rice paper. The pith plant—*Arabia Papyrifera*—from which it is made, is shown in section, and also in course of cutting. This plant is of such peculiar growth that the fibre can be unrolled from the stalk, forming a continuous natural textile fabric of gauze-like appearance. Several samples of printing paper of tolerable quality, and some very fair cap papers are shown. The latter is tough and well made, and might easily pass for an English-made cap.

Egypt is badly represented. We find only a small quantity of coarse, roughly made, grey paper. That Egypt is *able* to produce a fair paper is evident from some samples I have in my possession made at the modern mill of the Viceroy, Cairo. There is a fine display of fibres for paper-making, such as esparto and diss, which grow in abundance with little or no cultivation.

Turkey sends a collection of fine fibres, but no paper except in the form of books; and I could not understand if the paper on which they were printed is their own make. In the portion of the transept allotted to Greece there is a small parcel of a cartridge-like paper. It is placed too high for examination, but apparently is of a fair quality, and made from rags.

Passing now to the Russian Annexe, the advantage of the application of machinery is at once apparent in the variety and improved style and finish of the paper shown. We now meet with machine-made fancy water-marked writing paper, made in continuous lengths and in rolls of great width. Two rolls are shown—one white, and the other of a rich pink tint—both with a clearly-defined water mark displaying great skill in the manufacture. We find also some machine-made cigarette papers of fine quality. A ream of them in double crown is marked $2\frac{66}{100}$ kilos., price 8fr. 20cts. (say, in English weight, 6 lbs., price 6s. 10d.). Some machine-made writing paper is not so creditable, being of a poor pinky shade and muddy in appearance. A printing paper, fairly clean, but low in colour and badly put together, is marked at the rate of 5¾d. per English lb. (a penny per lb. more than its present value in the English market). It is in this Annexe that we first find wood used as a paper-making material. To this we shall refer subsequently.

The Hungarians estimate the importance of their paper manufacture so highly as to exhibit their specimens in the transept; but unfortunately all are in locked glass cases. So far as could be seen, the various qualities represented are uniformly good. We here note the use of straw as a raw material to a large extent, and a very fair quality produced from it, excepting, perhaps, the straw browns. In the higher qualities the fine blue laid foolscaps and white cartridges of Smith and Meynier deserve special notice. This firm and two or three others display views of their mills. These are interesting, as showing their extent, substantial build, and favourable situation.

We now arrive at the Austrian Section, in which there is a much larger quantity and greater variety of paper than in that of any other country, some firms showing samples ranging from the coarsest brown to fine loan and bank note. Perhaps the most marked advance displayed in this section is to be seen in the variety of specialities for numerous purposes. Some of the Elhemühl Co.'s papers deserve particular notice. Their water-marked papers are exceedingly well made. Some portraits in water mark of well-known personages are unmistakable likenesses, and possess the merit of being distinct and clear when viewed on the surface, as well as when held to the light, especially in the blue-shade papers. Their laid linear writings, white and coloured, are beautifully marked, and in their fine blue wove thin writings the rich shade of colour and evenness in texture are highly creditable. The printings are not relatively so good; they betray irregularity of bleaching, and in several samples bad work at the machine. There is also that want of clearness so frequently to be seen in German and Austrian printings. The coloured printings are dull, particularly the greens and violets. This firm also exhibit homogeneous papers, which are very well laid together. Straw papers, too, are displayed in great variety. Some of this is remarkable for strength, and equally remarkable for manifest want of care in the preparation of the pulp. In a sheet of about 6 inches square I have counted 30 pieces of unbleached straw, ranging from ¼ to ½ an inch in length; and apart from this fault, it is cloudy in appearance. On the other hand, there are a few specimens of finer printings very well put together, clear and close. The Neusiedler Co.'s papers, both hand and machine-made, are distinguished by close texture and more than usual clearness of colour. In their hand-made water-marked papers the effect of dark shading to the letters is very striking; and in machine writings the water-marked leaves and other designs for tinted note are particularly good and clearly impressed. In addition to these we have marbled paper, executed with the most minute fidelity to nature. In the Austrian Section the specialities indicating new applications of paper are interesting; such as imitation leather for hat and cap linings, book-bindings, satchels, &c., which are shown in various leather colourings. There is also the paper parchment, to show the quality of which two bags were suspended containing water, which did not make the outside of the bag the least damp. The imitation wood paper is very striking. This is made specially firm and hard-sized, and afterwards surface-coloured in imitation of various woods, such as mahogany, deal, &c., and a high polish is then given, rendering the imitation very faithful. There are numerous other interesting Austrian exhibits, which we have not space to particularise.

In the German part of the Rotunda is an imposing display of paper with illustrations of its manufacture. These latter consist of numerous bottles of pulp, chemicals, and colours. A monster roll of printing paper, some miles in length, and large sheets of cartridge with heavy weights suspended, are sources of attraction to visitors. A great variety of paper is shown; a special feature being paper made of many colours in one sheet. This is a very clever production, and must have cost the maker a great deal of trouble to produce. The water-marked papers are good, but barely equal in distinctness to the Austrian. The printing papers, however, are superior in respect of solidity. A view of the mill shows it to be large and well arranged, at least externally.

Going west from the Rotunda we enter the Annexe appropriated to Sweden and Norway, where wood as a paper-making material seems chiefly to absorb the attention of the exhibitors. We soon become familiar with neatly cut blocks of wood, bottles of cut and crushed wood, and pulp. Most of the pulp is simply wood that has been ground and strained; but we are glad to notice that chemically prepared wood comes in for a good share of attention. To this we shall again refer.

From Holland and Belgium we have every variety of paper shown by two or three masters. They excel in antique handmade writings. Printings are generally deficient in firmness; there are, however, a few exceptions to this rule. One of the exhibitors shows samples of about 200 different kinds, chiefly writings, only a few of them being really good specimens. Straw appears to be largely used in printings and browns, and very poor things the latter are.

In the French Department there are four or five small cases of paper. In one of them we notice the superior quality of the cartridges. Another case contains principally printings. In these there is a marked improvement in colour as compared with any previous ones met with. The water-mark papers of W. L. Dumont's manufacture are splendid examples of dark water-mark, with light shading. The writings of C. Bécoulit and Co., the cigarette paper of Meyer and Co., and the photographic papers of Blanchet Brothers, are all of superior quality. Indeed, without exception, the French exhibitors appear to have taken pains to show nothing inferior, and only their best productions. In the transept there is an imposing display of decorative papers by P. Balin, of Paris. These are elegant imitations of cretonne and other furnishing hangings. Some that have the appearance of leather are remarkable for depth of colour ; others have a fine silky appearance. The paper used for these purposes must, necessarily, have been well sized and made regular in thickness, firm and strong. With these provisions as a foundation, allied with artistic skill in embellishment, we have as the result, a fabric unique, elegant, and useful.

The ingenuity of Spanish paper-makers seems to be absorbed in the production of cigarette paper. This is certainly a well-finished article, clear, thin, strong, and crisp; in the latter qualification it is unsurpassed, but I think equalled by the French. Their writing and printing papers are badly made; they are characterised by dulness in colour, and a copious sprinkling of dirt. The newspaper samples are wretched. In coloured and marbled papers they manifest more care and ability. The colours are bright, especially the yellow; and in all their qualities the thin sorts feel and look the best.

We now arrive at home, and are glad to find that, although Great Britain is only represented in the paper-making interest by two firms, these have done us justice. Cowan and Sons show samples of their splendid machine-made writing papers, amongst which their antique vellum-laid post and record-laid medium may be noticed for their close resemblance to hand-mades. In the whole exhibition I did not discover any machine papers so firm and substantial. The blue-laid and azure-laid papers are all fine colours. The firm of J. W. Saunders exhibit white and coloured printings, blottings, hand-made writings, account book, loan, and drawing papers, in a close glass case. We are, however, familiar with their papers, but might wish that some samples were open for the inspection of visitors, that they might more closely examine some fine specimens of English hand-mades. Pavy's patented felted fabrics, from a paper-maker's point of view, are not equal to P. Balin's (Paris) decorative papers. The latter have a solidity, and, when embossed, a clearness of outline which is not found in Pavy's papers. The colours, too, are dingy, and patterns indistinct, implying deficiency in sizing, and want of solidity, defects which are remedied in P. Balin's production.

The English Colonies are far behind. A specimen of Indian paper, made from the *Broussonetia Papyrifera,* is not to be compared with the Japanese from the same material. It is not only wild in appearance, but unevenly made; in one sheet I noticed a variation of thickness amounting to a difference, as I judged, of from 8 lbs. to 14 lbs. demy. It is not any better than a sheet of paper made from the same plant by natives in one of the Fiji Islands, which I have by me. This was made by the primitive method of beating out the fibre with sticks, on blocks of wood, into very thin gauze, and then pasting them together. A specimen of writing paper from the Punjaub is very much like our English glazed gray wrapping. Their best production is a special paper for kites. Australia is not represented, although they are manufacturing in Victoria very fair papers.

The greatest interest in the exhibits from the British Colonies attaches to the large collection of magnificent fibres. These are from all parts of the world, and if some cheap means of transit could be devised, would be a great boon to English makers.

Coming now to the extreme west, we search in vain in the American department for specimens of their paper manufacture.

We must now refer to the exhibits which illustrate the development of wood as a material for paper. Altogether there are over twenty exhibitors of wood pulp and wood paper, the largest proportion of which are from Norway and Sweden. In the Machinery Hall there is nearly a complete mill for the production of ground wood pulp. This comes from Switzerland, and includes a grinding machine for reducing the cut raw wood to pulp; a well-arranged system of cone washers and strainers to remove dirt and portions imperfectly ground; and a machine for running it into sheets, and drying, ready for paper-makers. The first part of this machine is very similar to the wet end of an ordinary paper machine. A wet felt leads the pulp from the wire through a pair of heavy press rolls, from which it passes over a large cylinder to complete the drying. This cylinder is about 5 feet diameter, and has no ends attached to it. Plates of cast iron fastened to the framing form the ends for the cylinder, which revolves on turned flanges projecting from these ends. Inside the cylinder there is a fire-grate, by the use of which the necessary heat for drying is obtained. The driving-wheel of the cylinder is fastened on its circumference. Altogether it is very ingenious, and is interesting as showing how quickly a clever machine can be devised when necessity requires.

In all probability ere long machinery of this kind will be regarded as a thing of the past. The so-called "pulp" prepared by it is simply ground wood or fine sawdust matted together. Whenever it is used, however carefully prepared it may be, its admixture renders the paper miserably poor, weak, and gritty. On the contrary, paper made from chemically-treated wood is remarkably tough and firm, and yields a firm, smooth surface. We therefore regard the exhibits relating to this mode of treatment as more important; and we hope that one result of the Exhibition will be to prevent the erection of any more mills for spoiling wood by grinding it. There are several exhibitors of chemically-treated wood; two are in the British Section, viz.—J. M'Nicol, of Glasgow, and Jas. A. Lee of Derby. The former shows Sinclair's process. Although they refer to their distinctive systems, so called, the principle of treatment is in reality the same, and based on the original patents of Houghton. The variations are simply in matters of detail. The one idea is to separate the non-fibrous from the fibrous portions of the wood by boiling it in strong alkaline liquor under a pressure of steam.

The omission from the Exhibition of Machinery for the chemical treatment of wood, is unfortunate, as it is to this material that paper-makers are anxiously looking for relief from the threatened scarcity of fibres. From the papers shown it appears there are difficulties in bleaching it sufficiently and uniformly white, for writings and printings. We see enough, however, to satisfy us that properly treated pulp from wood will produce a paper, which, in respect of strength and hardness, surpasses that from any other raw fibre in common use.

Having now described the machinery, and some of the most important exhibits of paper, so far as space will permit, it now remains to make some comparisons and deductions, suggested by a review of the whole.

I have before intimated that the display in machinery is meagre and unsatisfactory. Engineering firms that could have contributed the best machinery, have, with one or two exceptions, held themselves aloof. So far as our countrymen are concerned, the reason is probably this, that our engineers hesitate to show their machines without a proper protection against copying by foreigners. This is especially the case with Austria where the patent laws are so unsatisfactory. Probably the entire absence of paper-makers' engineers of America from the field, may be attributed to the same cause. It is not unusual to hear English machinists complain that Germans, and Austrians particularly, copy their designs, and that they do not invent for themselves. I am not able to judge of the justice of this complaint; but I may remark that in respect to the Swiss and Prussian paper machines shown in the Exhibition, there is a marked absence of originality. I could not discover in either a single useful feature which I have not met with in England; and, as I have previously intimated, there are some things retained in these machines which have been discarded for years past by English makers.

We cannot expect representations at such Exhibitions to be more complete until a scheme of international patent law is devised which shall provide sufficient protection to inventors, so that, without doing them injustice, nations may benefit from each other. I venture humbly to suggest that it is possible to make inventions national, and even international property; so that men who are without money to float and protect their patents—and on that account frequently keep their ideas to themselves—might bring them to light, and reap the reward of their industry. At the same time, the objection, that patents restrict manufacturing enterprise, would be met; as with such regulations men would be stimulated to send their most recent inventions to international exhibitions. When this is accomplished we shall make more rapid strides, and with the same material and labour far better manufactured articles will be produced. For example, in the development of wood as a paper-making material—British, German, Russian, Swedish, Norwegian, and American, papermakers are separately aiming to effect the same object. Each have, doubtless, mastered some branch of the subject; and I venture to say that if the disjointed ideas of these separate workers could be united, a paper vastly superior to esparto paper could be forthwith produced from wood. Meanwhile, forests of wood are being ground up into what is called "wood pulp," sold at £7 or £8, and not worth the money, which, if properly treated, would make magnificent pulp, five times the value of the other; thus valuable property is being ruthlessly squandered.

We must not fail to observe some national characteristics manifested in the exhibits of paper. From a general point of view the English papers are characterised by firmness and solidity, but have not, as a rule, such a close appearance as European papers generally. The Austrians and Germans apparently study more the tastes of their customers; their machine writings particularly have a style of finish calculated to suit the popular taste. We have something to learn here. A close examination of English makes will frequently show that they have an intrinsic merit which at first is not apparent; whilst with German and Austrian papers the reverse is the case. It may be questioned which is the more creditable—to make things seem to be better than they are, or to make things better than they seem. The French and Russians appear to take a middle course, but the former evidence a more uniform skill.

The Spanish cigarette paper gives token of a latent talent which makes us wonder how they can be satisfied with such wretched printings. It is singular that they should supply esparto, the raw material of a very large proportion of English fine printings, and yet not learn to use it themselves.

Taken as a whole, the display of browns is the most unsatisfactory. It is not relatively equal to the other kinds. There is nothing to be seen approaching to the style of first-class English glazed casing. A good show of English browns and caps would have been a valuable addition. The attention of Continental makers seems to be devoted more exclusively to the finer sorts, to the neglect of printings and browns, of which a much larger quantity is used.

With reference to the papers from China and Japan, we cannot but admire the patience and industry by which they produce, with the rudest appliances, papers so tenacious and respectable in appearance. Japanese wire-work, suitable for use in paper-making, well made, is exhibited ; and we also find numerous bottles of chemicals and colours, many of them useful in the manufacture. When we note these, side by side with magnificent fibres, we are forced to the conclusion, that, as the advance of civilisation in Japan induces the introduction of modern appliances, and as they learn to develope their natural resources of fibres, chemicals, water-power, and intelligent labour, they may become rivals in the European markets.

An important subject for inquiry now is this. How comes it that such large quantities of paper are imported to us from the Continent, whilst makers at home are complaining of ruinous prices and dulness of trade ? In Austria I was happily enabled to obtain some information tending to the elucidation of this question. I was informed that they have the advantage of cheap rags, cheap labour, and large water-power, and it is only due to their superior machinery that the English makers can hold their ground. A visit to a mill in Austria, which was kindly arranged for me, tended to confirm this view. It was a large mill, having force of water equal to no less than 160-horse power. Rags were cheap, and used exclusively. Everything about the mill was clean and orderly, and there was evidence of general good direction, except in respect to details of the machinery. As an instance, I may refer to their antiquated mode of cutting the paper after the machine. This was done by hand in the style which was discarded in England in favour of machines twenty or more years ago; and I find also there were about one-third more hands employed than would be in a corresponding English mill. This is probably a fair representation of Austrian mills. Here we find cheap labour, cheap power (coals, I am told, are also cheap), and cheap fibre, partially neutralised by inefficient machinery, and, to judge by appearances, indifferent ability in workmen. If these shortcomings were remedied, the Austrians would be much more formidable rivals than at present. The same may be reasonably inferred of the Germans or Belgians.

In the matter of colours for tinting white paper and for coloured paper, they have a decided advantage, judging from the exhibits of these substances. From Belgium, Germany, Austria, and Russia, came magnificent displays. We can scarcely imagine a finer ultramarine blue than that from the Marienberg factory, of which Dr. Hoffman is director.

In spite, however, of the natural advantages of makers on the Continent, not forgetting the general fine situations for their mills, we cannot fail to note that, excepting in a few specialities, their papers do not come up to the English standard. In printings and browns this is specially the case; although most of their printings in the Exhibition will compare favourably with English makers, yet in buying a few newspapers promiscuously on the route from Vienna, we must see that, compared with the average English papers, they are in appearance despicable.

There remains only one other subject to which I shall refer—viz., the treatment of wastes produced in the manufacture of paper. The only reference we find to it is in the collection of P. L. Simmonds, of London, showing the economic and industrial uses of wastes and residues from manufactures. Amongst this collection is an illustration of Mr. T. B. Houghton's chemical process for the treatment of pine wood for paper-making; one part of which is the recovery of alkali from the waste lye, by charging it with carbonic acid gas for the precipitation of the organic matters, leaving a clear alkaline solution. I am not aware if this result has been obtained in practice. This particular part of the process is said to be the invention M. Tessie du Motay; but I observe that a patent was granted in America in 1861 for this *identical* thing, to Mr. W. Lowe, of Baltimore. Strange, it seems, that the minds of men so far apart should run in the same peculiar channel; but, as may have been expected, the American was a few years in advance.

The utilisation of the waste liquors running from the boiling, and subsequent treatment of esparto and straw, is of the utmost importance. This may not have occupied the attention of Continental paper-makers very much, but in England, where prevention of pollution has been insisted on, makers have been forced to its consideration. This was at first sadly against their will; but, in spite of prejudices, they have now learnt to regard as a source of profit the black liquor, which, hitherto, had been looked upon as a nuisance.

The washing water, which is a wholesale source of pollution, still shares the same prejudice; and although a process which I patented about three years ago, and which dispenses with washing altogether, has, since then, been in successful operation, yet many paper-makers would even now consider the scheme Utopian. But the times will alter. We shall learn to regard all colouring of rivers as a costly work of painting, yielding no return.

I hoped to have found the whole question thoroughly ventilated at the Vienna Exhibition, for it was one that ought to be fully considered. In this respect, as well as with reference to machinery, it is disappointing to a paper-maker.

However interesting in itself so comprehensive a collection of manufactured produce may be, I conceive that the highest purpose of an International Exhibition is best achieved when it is not so much a museum—a record of the past—as when it anticipates and becomes an indication of the future.

Machinery in General.

By F. H. MILLINGTON, *holder of a Whitworth Scholarship, Owens College, Manchester.*

BEFORE going into details of any of the machinery, it would be best to give a general idea of the arrangement. The great bulk of the machinery was exhibited in the Machinery Hall, which was a large building to the north of the Palace of Industry, running parallel to it; it was about three-quarters of a mile long, by 164 feet wide; it was divided into three long halls, or, rather, one wide nave in the centre, with a narrow aisle on each side; these ran without interruption from end to end of the building. All the machinery that required driving was shown in the central nave, while the machinery at rest, or machinery such as steam pumps, sewing machines, &c., which did not require power from the shafting, was exhibited in the side aisles. The American section was to some extent an exception to this, for they put up shafting in the side aisles, as well as in the nave. Inside the central nave, and at such a distance from the wall as to leave a convenient roadway, there were two rows of cast-iron columns, carrying plate-girders on the top; to these girders the shafting was fixed. It was ordinary wrought-iron shafting, about 3½ inches diameter, turned up all over; the bearings were all of the American class, that is, they were adjustable swivel bearings, capable of being raised or lowered by means of screws, according as they wore, or their supports gave way. The shafting, with the exception of that in the American section, was made and put up by two Austrian firms, Sigl, of Vienna, and a firm from Prague. Most of the American machinery being light, they thought the shafting supplied would be too heavy, and so put up most of the shafting in their department themselves. This shafting was made by Messrs. Jones and Laughlin, of Pittsburgh; it was cold-rolled, and afterwards straightened, and seemed to be of good quality. The pulleys used by them were much lighter and neater than similar things in England. The Americans seem to excel in this branch of engineering, for their arrangements were the best in the Exhibition. Specimens of this shafting and bearings were exhibited in their section, besides that which was in motion. All the engines at work, unless driving some special machine, were applied to drive the shafting, the power being generally taken off by means of a strap on the fly-wheel, in other cases from a pulley on the crank shaft. The engines belonging to each country were supposed to drive the machinery in the section belonging to that country. On the north side of the Machinery Hall were the boiler-houses, each country having to supply the engines in its section with steam. The steam was taken into the hall by means of wrought-iron pipes, laid in brick trenches. So much for the arrangement of the motive power in the building. The same plan for the arrangement of exhibited goods was followed in the Machinery Hall as in the Palace of Industry; each country had so much space allowed, and was permitted to dispose of its goods in whatever manner best suited it in that space. The countries were placed in their geographical order, starting with America at the west end of Machinery Hall, then England, France, and, finally, ending with Russia at the east. Germany and Austria occupied by far the largest areas; then came France and England; after them Belgium and Switzerland. Italy, Holland, and Sweden had very small displays in this department; while several countries, such as Spain, Greece, and Turkey, were totally unrepresented. One drawback to this system is, that if anyone wants to study any special branch of machinery, they have to keep passing from one country to another, which wastes a great deal of time, to say nothing of the risk of not seeing some of the things exhibited.

The Machinery Hall was not large enough to hold all the things sent, so a considerable amount of machinery had to be shown in some of the outbuildings. All the agricultural machinery was shown in two large halls, called respectively the East and West Agricultural Hall. In the west hall were the English, French, and American exhibits; in the east, the German, Austrian, and Russian. Behind the Machinery Hall was a large wooden pavilion, in which several ice-making and brick and tile-making machines, pumps, fire-engines, and a large collection of other fire-extinguishing apparatus was exhibited.

Having given a general idea of the arrangement of the machinery, which, on the whole, was very good, considering the immense amount there was of it, I will now pass on to some of the branches which came under my notice.

WOOD-WORKING MACHINERY.

This branch of machinery was as well represented as any in the Exhibition, particularly in the English and American Sections, the displays in these sections being larger and better than those in any other. Besides the ordinary machines, such as saws, tenoning, morticing, moulding, and planing machines, there were several machines for special purposes, such as bucket-making, cutting out barrel-staves, turning hand-rails and wood pillars, &c. In the American Section, the machine which attracted most attention was the bucket-making plant. This was more a system of manufacture than one machine, for there were three or four separate tools on the bench; the logs were sawn out, tongued, and grooved, put together, turned up, and papered inside and out, and bottom put in, all at a bench about 12 ft. by 3 ft. Whitney, of Massachusetts, was the exhibitor of this. He also exhibited a lathe specially adapted for turning hand-rails or small wooden pillars; it was an application of the "copying" principle. There were three tools used: first, a slide tool, which turned the wood cylindrical and as small as the largest part of the finished pillar; just after that tool there was a ring rest on the cylindrical piece of wood, which kept it steady, while the second tool, which was a diamond-pointed one, roughed it out approximately to the finished state; this tool travelled along in a direction parallel to the axis of lathe, and at the same time was made to move backwards and forwards in a direction at right angles to the axis by means of a fixed templete, whose contour was the exact shape of the finished pillar; finally, the pillar was finished by a sharp knife of same shape as templete, which was brought up to the pillar, and just smoothed it up.

Among J. A. Fay and Co.'s (Cincinnati) exhibits there was a nice, compact horizontal boring machine, adapted for coach and waggon work. The bitt was fed forward by a foot-treadle, and brought back by a spiral spring. The table could be set at an angle for boring for level mortices. There were two peculiarities about these American machines; one was in the use of timber in the construction of some of the parts, as in a band saw in which the wheels or pulleys had cast-iron bosses with wrought-iron arms and wooden rims, and a fret saw in which the connecting-rod was timber with light wrought-iron rods; the other was the way in which they would make the same band drive two, three, or as many as four pulleys.

In the English section there were four large exhibitors, T. Robinson and Sons, Rochdale, S. Woram and Co., London, Powis, James, and Western, A. Ransome and Co., also of London. All of these had very large and creditable displays, and there is no doubt that in general wood-working machinery the English Section stood first in the whole Exhibition. Among Robinson's machines was their well-known dove-tailing machine, which was originally an American invention, but it has been greatly improved since it fell into their hands. They also showed some tool-grinding machines, in which the tool is held in a rest, which can be set so as to give the tool the proper angle. In Ransome's exhibit, which was the largest, besides a great deal of general wood-working machinery, they showed an arrangement for the removing of shavings, dust, &c., from the machinery. Powis, James, and Western, showed a band saw in which the shaft carrying the top pulley was fixed in a circular slot in the frame of the machine, so that the saw itself could be set at an angle with the table; the use of this is to obviate sloping the table. When any bevel timber requires cutting, this new arrangement will be much handier, as the timber will not have to be supported from sliding off, as in ordinary band saws. The same firm exhibited a band saw for sawing iron. This idea is not new, for saws of this description have been in use for some time at Woolwich Arsenal.

In the French Section the fret saw of M. Arbey attracted a great deal of attention, it being one of the neatest and best constructed in the Exhibition. There were some beautiful specimens of fretwork done by it exhibited at the same stand. The other exhibits in this Section were of the ordinary type.

In the Swedish Section, J. and G. Bolinder, of Stockholm, exhibited a very ingenious machine for cutting corks for bottles, &c. The cork was cut up by a small circular saw into square pieces of the right size and length; these were pushed along a little table, until they were each picked up in their turn by a pair of rotating spindles, which held them by pressure against the ends, while a fixed knife took off the corners and made them perfectly cylindrical; if they were required a little taper, the knife had only to be fixed not quite parallel to the axis of the spindles. The corks were beautifully finished, and an enormous number of them could be made in a day.

In the German Section I did not notice any new features in this class of machinery, although there was a considerable amount of it. The two largest exhibitors were the Chemnitzer Werkzenger Maschinen Fabrik, and Schmaltz Brothers, of Offenbach, on the Maine.

In the Austrian Section, G. Topham, of Vienna, had the best show, in which was a log-frame, where both top and bottom rollers are driven, an arrangement by which he obtains a better grip on the timber, a thing I did not see in any other part of the Exhibition. Messrs. Pfaff and Co., of Otakring, show a double circular saw for squaring timber, but there is nothing special in it. There were several other exhibitors, but on the whole their machinery does not come up to the English and American standards. Considering the immense quantity of woodwork done in Austria, their display of machinery was not first-class; but a few years may work a great difference in this, as it was understood that many of the English and American patents have been bought for Austria. In taking a general survey, it will be found that, with the exception of one or two special machines in the American Section, most of the improvements consist in matters of detail, which are common among all the best makers. In log-frames the tendency seems to be to do away with the heavy carriage fed forward with rack underneath, and to substitute in its place two light trucks running on rails to carry the log, while the feed-motion consisted of two grooved rollers, one before, the other behind the standards of the saw; the log was allowed to rest on the rollers until the pressure was sufficient to cause them to bite; the rollers were driven by the ordinary silent feed. This system may do for ordinary straight timber; but I do not think it will answer so well for the crooked oak timber grown in England. Most of the makers of band saws are doing away with the flange on the pulleys, alleging that it causes a deal of useless friction, &c., and that it is too far removed from the table to give an efficient support to the saw when sawing. The saw is prevented from leaving the pulley by a small plate of steel, or a roller in some cases, which is attached to the guide, which prevents the saw from buckling. In the Blanchard lathes, instead of the axis of the oscillating frame carrying rotating cutter being parallel to lathe bed, it is now fixed at right angles to it, and generally above lathe bed; the consequence of this is that the revolving cutter, instead of cutting across the grain of the timber, cuts along it, leaving it much smoother than formerly, and the piece of wood is also much steadier while being turned.

HYDRAULIC MACHINERY.

The amount of machinery which came under this heading was very large, as most countries had something or other to show in this department, the exhibits from Germany and Austria being very large.

The display of turbines and centrifugal pumps was very large, particularly in the foreign sections; but there were very few novelties to be found among them. I did not see anything of this class from America; but in the English Section, J. and H. Gwynne, of Hammersmith Iron Works, showed some very large centrifugal pumps capable of lifting 3,000 gallons a minute 30 feet high. J. Bernays, of London, exhibited a patent centrifugal pump, the improvement consisting in keeping the journals cool by means of a stream of water, the water-chamber of the journals being connected with a passage to the discharge pipe of the pump; the water was allowed to escape into the suction inlet of the pump, the diminution of pressure caused by the working of the pump being sufficient to produce the flow of the stream through the journals.

At Gwynne and Co.'s stand, besides a collection of centrifugal pumps, hydraulic rams, &c., there was a small parallel flow turbine, the chief feature of which was the arrangement for controlling the supply of water to the machine. The upper ring or plate containing the guide vanes was divided into four parts or quadrants, two of which, opposite to each other, contained the guide vanes for directing the water into the buckets of the turbine. The other two quadrants were solid, so that the area of flow through the guide vanes was only half of that through the buckets. The advantage of this is that the water will pass more freely through the machine, not so much of its energy being wasted in internal disturbance and friction. The regulator for varying the area of flow according to the supply of water, and the work to be done, consisted of a plate, which, when the machine was at full work, just covered the two solid quadrants of the upper plate or ring, but which, by means of a segmental rack and pinion, could be made to cover any or all of the guide vanes, thus affording an efficient means of stopping the machine entirely, or of regulating its supply of motive power.

Brotherhood and Hardingham, London, exhibited Boulton and Imray's "Helical" Pump, worked by one of their three-cylinder engines. This pump consists of a paddle-wheel, which works in a casing, round the circumference of which a helical channel winds. As the paddle-wheel revolves it drives the water along this passage, which, being helical, causes it to rise. The advantages of this pump over an ordinary centrifugal pump are, that the section of the stream of water is uniform throughout, it being well known that changes in section are apt to produce loss of energy, and that for the same lift and volume the speed of rotation is much less than in a centrifugal pump, which is a great advantage, as fluid friction increases very rapidly with the velocity.

Among the French exhibits of this class were Neut and Dumont's, Paris, centrifugal pumps, for which many superiorities are claimed, including prevention of drawing air through the journals of the shaft by having water chambers in them, adaptability for pumping viscous fluids, and ease with which they can be cleaned, owing to peculiar construction. Whether they possess these advantages or not, I cannot say; to me they seemed very much like ordinary centrifugal pumps.

In the Swiss Section, Sogin and Wick, of Basle, exhibited a good collection of turbines, including one about 4 or 5 feet in diameter, on Girard's system. It was a parallel flow turbine, the chief peculiarities being that the guide blades only extended over about one-fourth the circumference of the buckets, the rapid increase in the area of flow from the top to the bottom of the buckets, and the use of holes in the external casing of the buckets to facilitate the escape of air and water from them.

The Maschinen Werkstatter und Eisengiesserei, of St. Georgen, also had an excellent show of turbines. This firm also exhibited a hydraulic press for the manufacture of maccaroni.

This class of machinery was very well represented in the German Section, their display being the largest and best in the Exhibition. This is not to be wondered at, seeing that the turbine was originally a German invention, and the great demand there is for them, owing to their great natural advantages in the supply of water, &c., necessary to drive them.

The two largest exhibitors in this Section were Nagel and Kampf, of Hamburg, whose stand was in the centre of the Machinery Hall, and attracted a great deal of attention, as they had their turbines and pumps working nearly every day; and Straube, of Geirslingen, of Würtemberg, whose machinery was in a pavilion near the east end of the Machinery Hall; he was almost the only exhibitor of water-wheels in the Exhibition.

In the Austrian Section there were some outward flow turbines on Fisher's (Vienna) system; and some centrifugal and other pumps shown by Knaust and Co.; but they did not merit any special notice. Russia also sent two models of turbines from St. Petersburg. This class of machinery does not show any remarkable advance upon that shown at Paris in 1867; most of the improvements which have been made are chiefly in matters of detail. The turbines exhibited from Germany were the best, those from Switzerland being next, while the English centrifugal pumps were at least as good as any there. Of steam pumps there was an immense number, comprising every possible type and form; in the English section alone there were about a dozen exhibitors.

These pumps may be divided into two classes, rotative and non-rotative :—rotative pumps, in which the steam piston drives a crank-shaft, and the steam valves are worked by an eccentric (in these pumps there is generally a fly-wheel ; the well-known "Vauxhall" pumps of Alexander Wilson may be taken as a type of this class) ; non-rotative, in which the pump plunger is generally a continuation and enlargement of the piston rod, and in which the steam valves are worked by tappets, levers, or auxiliary valves, as the case may be. Of this class Tangye Brothers' "Special" pump may be taken as the type. Both these classes were well represented, most of the English and the two American pumps exhibited being of the non-rotative type, while most of the Continental pumps, with the exception of some of the German ones, were rotative pumps. The two American pumps were neat serviceable pumps ; exteriorly they did not present any great difference except in the mechanism for working the steam valves. In the Norwalks Iron Works Pump the valves were worked by an arm keyed on that part of the piston rod between the steam cylinder and pump cylinder ; on this arm was an eye which slid along the slide-valve rod, and when near the end of the stroke struck a collar on the valve rod, thus reversing the valve. In the other, which was from New York, there were two short spindles which passed through cylinder ends ; as the piston came to the end of stroke it pushed the spindle out, the spindle moving the valve by means of a lever, with one end of which it came in contact, the lever at the other end of cylinder pushing the spindle at that end into the cylinder ready for the next stroke. In the English section, besides the already mentioned "Vauxhall" and "Special," there were Brotherhood and Hardingham's "Paragon" Pump ; Clarkson's "Excelsior," exhibited by a Glasgow firm ; Hayward, Tyler, and Co.'s "Universal ;" and those of several other well-known makers : to describe all of them would be waste of time, as the constructions of most of them are well known. Hayward, Tyler, and Co.'s "Universal" attracted a great deal of attention from the simplicity and compactness of its appearance. It is a double-acting non-rotative pump, its chief peculiarity being its valve-gear, which is inside the piston. The steam and exhaust pipes are on opposite sides of the cylinder, about the centre of its length. The piston is long and hollow, and contains a cylindrical slide valve. The piston passes at each end of its stroke over the steam and exhaust passages, and causes the valve to move so that the steam supply and exhaust are reversed. The great advantage of this pump is that it will start in any position, as there are no dead points. France, Belgium, and Switzerland showed scarcely anything in this department; there was one pump from Paris, a rotative pump with two single-acting trunk plungers. Schmidt, of Zurich, exhibited a pump of a peculiar description, in which both the steam and water cylinders are oscillating, the piston and plunger being both attached to the same crank pin of a shaft which had a fly-wheel at each end; the oscillation of the cylinder is made to control the admission and the exhaust of the steam; the valve face is cylindrical and works in a suitable bearing, containing admission and exhaust ports, the parts in the valve face being brought into connection with them alternately by the oscillation of the cylinder. Fielding and Platt, of Gloucester, are the English makers of these pumps.

In the German Section there were six or seven exhibitors, the largest being Decker and Co., of Canstatt, Würtemburg, most of whose pumps were non-rotative, of the same type as those in the American Section exhibited by the Norwalk Iron Works Co.; Decker and Co. being the Continental makers of these pumps. Several of the other exhibitors were Berlin firms; most of their pumps had automatic valve-gear, but otherwise did not present any striking features. The Austrians made a good display, as far as number; there were about half-a-dozen exhibitors; most of the pumps were rotative, and did not differ very much from the ordinary patterns of that class common in England. Most of the exhibitors in this section came from Prague, or Brunn.

Fire-Engines, &c.

There was an enormous quantity of fire-extinguishing apparatus shown; a great deal was in the side aisles of the Machinery Hall, the rest being in pavilions in the grounds. The three largest exhibitors were Austria, Germany, and England; all three showed both steam and manual engines, though the latter class predominated to a great extent. Most of the Austrian manual engines had two horizontal pumps, single acting, connected with one air vessel. Among the exhibitors in this section were—Knaust and Co., of Vienna, and Wulzer, of Pesth. The latter exhibited some engines especially adapted for use in towns with narrow streets; the engine proper was loosely mounted on an ordinary four-wheeled carriage; when the streets were too narrow for the carriage, the men dismounted the engine and carried it. These engines were very light and well made. The steam fire-engines, neither in the German nor Austrian Section, appeared to me to be so good as those exhibited by the two

London firms—Shand, Mason, and Co., and Merryweather and Sons. The chief exhibitor in the German Section was Reinhart, of Wurzburg. In the English Section Merryweather exhibited some both steam and manual, similar to those in use in the London Fire Brigade.

Shand, Mason, and Co. exhibited their treble-cylinder engine, and an improved single-cylinder engine, in which they had dispensed with the fly-wheel; the improvement consisted in putting an auxiliary piston on the valve rod of the steam cylinder, the valve of the auxiliary cylinder being worked by a separate gear. The Americans showed one steam fire-engine of a peculiar construction, B. Holley's patent, in which the pumps were rotary pumps, worked by a rotary steam-engine; it looked very compact and serviceable, but I do not think it would be very efficient.

The arrangements of the Exhibition authorities for the prevention of fire were very complete, and showed a great deal of care, for, besides engines and men stationed all over the grounds, most of the engines exhibited were always ready for use. There were three large pumping stations in different parts of the ground, fitted up with first-class machinery—one by an Austrian and the other two by French and German firms—to provide a plentiful supply of water in case of fire, and for the use of the fountains, machinery, &c.; pipes from these water-works went up and down the grounds, there being about eleven or twelve miles of piping altogether, and hydrants were fixed at every suitable spot.

Besides the hydraulic machinery already mentioned, there was a large quantity of miscellaneous machines of this class—such as rams, hydraulic jacks, and presses, two or three examples of water-pressure engines, but none of them very new, and a whole host of ordinary force and suction pumps, for agricultural and domestic uses, all of which, to believe the makers' prospectuses, possessed some special superiority, though, as a rule, their improvements did not repay the time spent in discovering them.

The cranes exhibited were neither very large in number, nor yet showed any very marked improvements. The only two classes that were well represented were the locomotive, or portable, steam crane, and the travelling crane. There were six or seven locomotive cranes, which were so much alike in their general features that one description would almost serve for them all. They had vertical boilers, fixed so as to counterpoise as much as possible the weight to be lifted, and were fitted with slewing and traversing gear, and generally with gear for adjusting the radius of jib ; the chief distinctions were in the methods of reversing the engines, it generally being done by a modification of link motion. In those exhibited by Appleby Brothers, London, it was done by means of a helical feather on a shaft, with small cranks on the ends, which worked the slide-valves. The cranes exhibited by Appleby Brothers were similar to those sent to Paris, and seemed well adapted to stand the rough work that this class of machinery is subject to. Aveling and Porter had a very nice arrangement of crane mounted on their traction engine ; this was said to have been found very useful during arrangement of the goods in the Exhibition.

There were three or four travelling cranes, but the only ones worthy of much notice were those exhibited in the German Section of the Machinery Hall by L. Stuckenholy, of Wetter, Westphalia. They were to lift 25,000 kilogrammes, and were driven by a rope running at a great speed, similarly to those in the London and North-Western works at Crewe. All the gearing is fixed at one end,—an arrangement which enables them to use only one cross-girder, which is wrought-iron, of a hollow section. The chain is of the flat-link class, and is carried over two pulleys on a truck which runs inside the hollow cross-girder. Altogether this crane was a fine, well-made machine, and was one of the best pieces of crane-work in the Exhibition.

MISCELLANEOUS MACHINERY.

The machines exhibited which come under this heading were both large in number and varied in design, both with respect to the end desired and the means taken to obtain it. It would be folly to attempt more than a notice of a few of the more striking objects of this class.

In the American Section, Sellars, of Philadelphia, exhibited a large rotary mechanical puddler. It consisted of a large globular vessel, somewhat similar to a Bessemer converter in shape and construction, except that it had only one trunnion, about which it revolved and through which the charge was put in and taken out ; the products of combustion passed through this vessel, which was caused to rotate slowly by an engine attached to it. In this Section, N. C. Styles exhibited a dead-blow hammer. The hammer was wound up by a strap, on a pulley fixed on the top of the wooden guides ; the hammer was disengaged by a catch on a rod in front of the machine and fell on the anvil, the length of stroke being regulated by this catch.

In the English Section, Mr. Scott, of Manchester, had a wheel-moulding machine. The principle of this machine is to make a small segment of the wheel, generally containing about 4 or 6 teeth. The machine itself consists of a central pillar with a radial arm, the arm being worked round by wheel-work. The segmental pattern is fixed at the end of the radial arm, which can be lengthened and shortened according to diameter of required wheel ; the pattern is lowered into the sand, and the mould of a small portion of the wheel is then made ; the pattern is raised up, and the arm is turned through an aliquot part of the circumference, and another part of the mould is made ; and so on until the mould is finished. The pillar carrying the machine is then lifted out, and the mould for the boss and arms made. It will mould bevel wheels as well as spur.

In the German Section a Chemnitz firm exhibited a moulding machine, very similar to this, said to be a copy of it. Thwaites and Carbutt exhibited a large Rost's blower ; it consists of a long box, in which two shafts rotate rapidly one being driven, generally by a pulley, if the blower is small, and by a small engine, if large ; this shaft drives the other round in the opposite direction by means of two equal sized spur-wheels ; on each shaft, in the inside of the box, is a long two-lobed wheel ; these are keyed on so that the lobe of one just fits in the hollow of the other as they rotate. They produce a very efficient draught, and are rapidly coming into general use. In the French and German Sections there were several rock-boring machines or drills ; among them were some on the systems of Dubois François, Sachs, and Oesterkamp. All of them were worked with compressed air, and exhibited with most of them were the air compressers required for their use. There was a beautiful machine in the German Section for planing the spiral grooves or fluting in stone columns ; it consisted of a reciprocating table, as in an ordinary planing machine ; the column was fixed on the table with its axis parallel to the direction of the table's motion ; while the table moved backwards and forwards the column received a rotary motion proportional to the pitch of the spiral required.

Ceramic Ware.

By EDWARD LOCKE.

THE great number of exhibits and the very limited time at my disposal rendered the task of reporting upon the pottery in the Vienna Exhibition a serious one; but I have endeavoured to give an idea of the principal articles exhibited on each stand, pointing out their excellences and defects, and where new paths are being struck out, and of the results obtained. The great advance made in the ceramic art during the past twenty years, and the high art now applied in its manufacture, require not only the technical knowledge of the artisan, but also the experience of a trained artist, to give an adequate estimate of the numerous articles exhibited. The views expressed are honestly given, and if I have in some respects failed to combine the judgment of the two, I must plead the great difficulty of the task.

On my return journey I took the opportunity of a few hours' stay at Dresden to visit the Royal Works, knowing that a short account of some of the processes, &c., would be interesting to some of my fellow workmen. I have made this an Appendix to my Report.

Japan

Is one of the most interesting of all the countries that send pottery. First stands the Tamango ware—a buff earthen body, with a rather dull glaze; the style of decoration upon it is beautiful indeed to any one taking a delight in Oriental Art. There are some teapots and cups without handles with what a potter would call a defect in the glaze; it is crazed all over in very minute lines; not like the crackled china so called (for that is a crack upon the surface of the ware to the depth of the sixteenth of an inch), but this is a surface craze in the glaze, and it helps to tone the general colour of the ware. The colours have an opaque appearance, but the drawing of the flowers is very pure. In the same class of ware is a complete breakfast service; it is the best of any of this sort of ware. The details of the flowers painted upon it are clouded at intervals with minute dots of gold, which help to take from it the bareness of the surface of the body. I should like to see some of it in England, so that our workmen might see a specimen of Japanese decoration. There are breakfast cups and saucers in porcelain, decorated with flowers and gold; but the shape of the cup and saucer are evidently an imitation of a Western outline, possibly French, and the detail of the modelling is Japanese—it is a meeting of East and West in Art. There is a dinner set, the shape of the covered pieces of which they must have copied from the French. The handles and knobs are exact in outline, but on the surface of them is the Japanese modelling. The decoration upon it to a European is almost comical—like a band of print that one of our printers would put round the rim of a saucer, cut into pieces and stuck by chance on the surface of the piece; but they use the clouded dots of gold to break the abrupt lines of the detached pattern on the white porcelain. Very noticeable are two large vases, about 3 feet high, having dark brown ground, on which are birds and flowers, in what looks like mother-of-pearl. It has a singular effect. I think it is nothing but a kind of lustre similar to that used in England upon Parian, but its beauty here is in the application of it to produce the light in the decoration.

There are several large vases in porcelain about 5 feet high, with the dragon modelled in low relief upon the surface. Between the modelling are painted birds and flowers on the flat, in dark blue under the glaze. I have not seen any colour so good as this on porcelain. There are two vases that I see are bought by a gentleman in the North of England. The blending of colour in the pattern is one confused mass; but the disposition of the colours is good. It is a wonder how they made them all harmonise. The colours are much darker in tone than is usual with the Japanese. Close by there is a pair of vases (an exact copy of a well-known vase which has been made in France for years). They have not altered the line in the least, in either the body or foot, but they have attached to it a handle of their own. There is no attempt at French decoration. The decoration is pure Japanese, with flowers and gold; and I must say that I should much rather have seen the decoration upon one of their own shapes. There are three large plaques or dishes, about 4 feet across, in porcelain; and two of them are decorated with foliage in dark blue, and beautiful and rich the colour looks under the glaze. The centre dish has a view of a Japanese house and garden, and I should think the drawing and colouring are in the best style of Japanese art. The large dishes were well made and got through the firing. I am surprised to see so many things in the case based upon Western outlines, as is the case with almost every other thing. I am sorry to see it, for we shall lose all the charm of the pure Japanese style. I suppose they find it profitable to please the European taste, as I understand they are manufacturing it to order as fast as they can; but the new Japanese make will not touch the old, when they worked for the love of their art. There are a few of those cups and saucers with covers to the cups which are a wonder to a potter; what system they had of firing them and yet keep them so straight, and in the making of them keep so regular in thinness, is a mystery. There is a round dish, about 12 inches, which is a fine specimen of raised enamel with leaves and flowers; also three small basins of the same. I expect they have not done much in this line, as I do not see another specimen, and these are bought for the Berlin Museum, the authorities from which have been very busy buying from this stall. There are two cups and saucers in thin porcelain with a tall shape, painted with figure upon the white in pale tints; they are perfect for the style of decoration. There are three basins about the size of a slop basin, with embossed flowers modelled—not in very low relief—inside and outside, and the basins do not exceed the thickness of an ordinary one made in England; it certainly would puzzle an English china potter to do it. There are several cups and saucers (copied in shape from the Worcester ware made about fifty years ago at Messrs. Chamberlain's), having a coloured ground, with flowers stencilled out and the stems in gold upon the colour; they must have had one to copy from. There is a fireplace made in porcelain, the upright jambs and the top moulding area of which is a copy of an English make; but they have painted birds in blue upon it in the most confused manner. There are two sets of cups and saucers, exact in shape and similar to one with a twisted handle, made by Messrs. Minton, and a cup that is made at all the Longton manufactories with a ring handle. Also a déjeuner set—a copy of old Dresden in shape, the panels being the same, but the details Japanese. There are two toilet sets, an exact copy of one of Messrs. Minton's make. The decoration is a blue flower under the glaze, and it certainly is a model of decoration. I should expect to see it copied in England; it would print well if engraved with a careful study of the shadows. They show some small earthenware butter dishes with coloured glazes—one in reddish chocolate, and green, and yellow. I should like to see the Japanese do some large pieces in their ware. I have not seen any of the English coloured glazes so even.

CHINA.

From this country a very large collection is shown, and, coming from the Japanese Court, all the porcelain looks hard in colour; the colours are more opaque and harder in the lines of drawing, and there is not that minuteness of decoration. All the things in this Court are better laid out, and the quantity of large vases imparts an imposing effect. The exhibits are all wonderful in their harmony of colours. One that attracted my attention among so many was an oblong box about 8 inches long, perforated in the ends, with a yellow ground of diaper, and with flowers raised on it. The combination of the whole was perfect. There is a lot of crackled ware, which would turn the heads of most old ladies. The cups with covers are nothing when compared with those from Japan for careful making and firing. A vase of crackled china, with the crackled lines wide apart and running up the outline of the vase as if drawn at random, was quite unique. Two garden seats, with a celadon glaze and raised white *pâte-sur-pâte* flowers, very beautifully arranged; I cannot exactly tell how it was done, the celadon was kept so clear from the white flowers. There are a number of garden seats, one with a yellow green glaze very good in colour. Several spill cans—the design a bundle of bamboo canes; it was well arranged, and coloured to suit the canes. A square-top flower vase, with little berries on a stem made by hand, and laid upon the vase, is very good in its arrangement, better than we often see such things done in England. Some teapots and cups, with groups of flowers in very pale tints of grey on a beautiful blue, are the best I have seen of the Chinese in this style of colouring. A déjeuner set, with square tray, in the yellow ground they are so fond of, with flowers raised upon them; the harmony of colour was wonderful. I was quite pleased to see the Chinese keep so conservative in their art, till I came to a case at the bottom of the Annexe, in which I find the Celestials are on the move at last. They send us tea, and they intend to send us tea-ware to suit our taste; for their case contained a complete tea-set, teapot, sugar, cream, two bread-and-butter plates and slop, with the usual number of cups and saucers, in shape an exact copy of an old Dresden, and made to look, at a casual glance, like one made in England. But the detail of the decoration being Chinese, the things all looked hard in outline and finish. I think they can do their own style better than ours. I saw some terra cotta on one stand. There was a round jar with cover, and raised leaves rather rude in manufacture. From the treatment of the shades of colour in the ground, one could almost think they had begun copying from one of the majolica of Europe.

INDIA—MADRAS.

India sends a small collection of terra cotta and tiles. A black body with a smear upon it is very different to anything European either in form or decoration, for they have used lines of silver upon the black, and in a pure Indian ornament. The white terra cotta is very good in form, and well made upon the wheel; none of it is very large, and it is principally for domestic use. There were some beautifully designed large slabs for a wall in terra cotta, well worth a careful study as an illustration of Indian Art. The interlacing flower pattern is perforated. I do not think they were moulded, but am of opinion they were cut out by the maker. I wonder none of them had been selected for the museums. Coloured majolica tiles were shown, and the style of art was very good, pure Indian, but rather rude in manufacture.

RUSSIA.

The Royal Porcelain Works of Russia have made an effort to be represented at Vienna, and it is to their credit. Of the Government works represented in this Exhibition the first place must be given to Russia for showing progress. All on the stand is well shown, and the stand itself is one of the best I have seen for displaying pottery. It is covered with purple. I should think the leading artists employed are mostly French, from the treatment of the painting and the outlines of some of the vases. There is an absence of the large vases Russia used to show. All shown here are moderate in size; most of them are mounted in ormolu, and the painting of the flowers upon them deserves the highest praise; the gradations of colour in the backgrounds of the vases, beginning at the plinth in one shade and the top in another, and yet not affecting the general composition of the design, was perfect, and had a good effect, but it would not do for an inferior artist to attempt such treatment. There are two slabs of raised flowers made by hand, very well grouped (much better than some we often see in England), but the flowers themselves were not any better. There is a perforated dessert plate, very good, done just to show the workmanship; a tazza of *pâte-sur-pâte*, on a celadon ground, very well done; and a similar tazza with the white clay worked upon the surface of the celadon, in which there were more lights and shades than could be got by *pâte-sur-pâte*. It was very carefully done, and full of merit.

There is a novelty in the decoration of a déjeuner set. It has a celadon ground, with a pattern raised (I think in white enamel) to look like a piece of lace laid upon the tray) and the other pieces. Between the lace are painted small roses in colour ; it was well treated, and deserved notice. A tea set shown decorated in the Persian style is good ; the teapot, sugar, and cream are all throwed and turned, and well regulated for thickness. There is a small tazza with blue *du roi* ground, and raised gold upon it. I have seen better raised gilding, and the dark blue is not so good as the French. Also a plate with Persian ornament in two shades of enamel, with a pleasing effect. A flower vase, in bisquet celadon, is shown, but the modelling upon it looks hard, and the shadows do not show well. Altogether the Royal Works show good work done, if not any new development of the potter's art.

I must mention some Moorish tiles, &c., shown by the Government of Russia in the nave of the building. They are of the fourteenth and fifteenth century, and are splendid examples of Moorish design. They had formed parts of a cornice and of a pillar. There had not been any moulding of the pieces, but the maker had put the clay into the shape, and cut the design out of it; the undercutting was so deep, and the drawing of the design so good. The pieces were made by an artist, not by a machine or mould, as most modern things are. It had a charm of its own that made one linger round it.

HUNGARY.

Maritz von Fischer.—This manufacturer showed more on his stand than any other of the Austrian Empire, and I hardly know how to describe the exhibits, there were such a mixture of all styles and makes of porcelain dinner sets, tea sets, and dessert sets, as thick as they could be put, and all copies of old Dresden, Sèvres, Capi de Monti, old and modern Worcester, Minton's, and I think everybody else having a name for making porcelain. But they are very bad copies ; I did not see a good made piece among them—the plates and saucers are fired so badly, and with such an inequality in the surface, and all the plain parts on the sides of the jugs show us the pinching of the fire. I saw the Prince of Wales had bought a tea set of perforated porcelain in the Chinese shape, and with a perforated lining inside ; the handles of the pot and sugar box were also perforated, and the set was certainly the most meritorious work upon the stand. But the set had a clumsy appearance, the pieces being too large for what they were intended. I saw a copy of a well-known desert plate with a perforated edge and cupids painted in the bottom, manufactured by Messrs. Minton. If the artist who did the original were to see this copy, he would be rather shocked at the great diversion made from his design. The Capi de Monti ware was quite as bad a copy ; very different from the same style of ware shown by the Marquis Guiori in the Italian Court. The best painting was some figure subjects on plates and a few slabs ; the colours were brighter than the rest of the things, but with a hard look upon it. Several large fruit dishes, copies of some of the ugliest Dresden things I ever saw, with a lot of labour upon them. If they would only copy the good things, I could understand that. There is a large vase about five feet high, with a Chinese outline and perforation upon it, covered with dark blue ; it was something to remember. I saw that many of the things are sold to German nobles ; I hope they will keep them in Germany.

Wilhelm Zsolnay shows a small collection of tea and breakfast sets ; the pieces are made better than those of the other firm. Some are painted in the Japanese style, but the colours are poor and the effect weak. He also shows some earthenware vases, the flowers on which were painted in coloured glaze upon the bisquet surface with a very novel effect. This stand had a naked appearance when once contrasted with its overcrowded neighbours.

AUSTRIAN EMPIRE.

Grafljos Oswald von Thunsghi, Porcelain Manufacturer.—Mostly sets of dinner ware, one set well decorated in the Pompeian style ; the glaze looks hard, and the outlines of the covered pieces are a copy of the French. There are china plates with crests ; the potting of them are not what an English house would send out. There is a toilet set well decorated in the Turkish style ; but the outline of the jug and basin is Greek, and not good. The tea sets are of the same shape as those of most of the German exhibitors, a general copying of the same form, and that a very ugly one. A déjeuner set of very chaste decoration in gold ; but the teapot and the other pieces are extremely hideous in shape. Also a toilet set in china, with the flower painting in the worst style of the French, and the shape clumsy. There is a large bisquet porcelain jug with a pale blue ground ; the ornament embossed upon it is very weak and poor.

Erst Elbogner, *Bohemia.*—The usual large vase, very ugly, and the tea ware in porcelain, with the heaviest of ground colours, to look upon which would almost make the eyes ache. Several of the things are done with a good intention, but with no feeling for art. The teapots are all in the same form as the others exhibited by Germany. The best thing upon the stand is a pair of flower-pots decorated in the Persian style. A toilet set painted in a blue Indian pattern is very passable, much better than the average.

G. Heinz.—On the stand of this exhibitor were shown groups of flowers painted in the first place on a slab, after which the background of the slab is cut away from the flowers, which are then laid upon dark velvet, the stems being indicated by marks made upon the velvet ; it had a good effect. I made inquiries about it, and was told that the background is all cut away by a grinding wheel. If so, it would entail a deal of labour ; but the china made in Germany could be cut after the first fire very easily, as it has made scarcely any contraction then. I fancy all this stand is the contribution of working decorators. There is a pair of flower-pots done very well with pure Renaissance ornament in colours. The pieces of flower and figure painting are not very good. There is a small pair of vases in imitation of *pâte-sur-pâte*, done with enamel, which is a fair attempt. There are several slabs of groups of flowers, but the colours look hard, and they have much to learn before they can take their place among good flower painters.

Hlois Gepwald Maler, Bohemia.—This is an exhibition of porcelain ; but the stand has scarcely anything meriting notice. He has evidently had good models to work at. There is a dish decorated in the Chinese style, upon which he has put his own construction of the details of the ornament. The rest of his exhibits are very indifferent.

V. Kosch, Vienna.—A decorator of porcelain in Vienna. Specimens of dessert plates, nearly all decorated in the Persian and Indian style, but the heavy colours lack that brightness seen in the English. The light tints are better, but most of the designs are a leaf out of Owen Jones's *Grammar of Ornament.* He also exhibits a tazza, made in terra cotta, upon which is painted a female head in enamel, very well done, with a deal of freedom in the drawing, and bold shadows ; but the colours partake of the earthy look of the terra cotta.

Ferdinand Beck, Decorator of Porcelain, Vienna.—This decorator exhibits some tea sets with a black ground and fine gold lines upon the white, done with a lot of labour in a style the German gilders are fond of ; the contrast of colour seemed too severe, the lines of gold being too fine to warm the black.

Franze Kadler, Vienna.—The exhibits on this stand are of a superior character. There are two saucers with raised gold decoration upon a blue *du roi* ground; the raised gold is as good as any specimen I have seen, better than the average raised gold in England. One specimen is treated like the dessert plates at Kensington Museum from the Royal Works of Vienna. I do not think that it is worked with the pencil; one could almost think it was stamped out and fastened with a flux in the enamel kiln, the markings of the leaves and flowers are so sharp. The other saucer is decorated in the Raphaelesque style upon a blue ground; very good, indeed. A plate also in the same style of ornament, with the raised part of the panels in silver; it looks rather cold, but it is surrounded by plenty of gold. The figure subjects in colour are painted with good broad effects. Altogether I am pleased with this stand. It does not show a good thing mixed with a lot of poor things, as so many of the stalls do.

I saw several large exhibits of Vienna album and bookbinding firms, and in the covers of the large albums were shown the application of the flower painting with the backgrounds cut away, as on the pottery exhibited by G. Heinz, and described by me on a preceding page. I was pleased to see what a beautiful and good adaptation it was of porcelain used in the decoration of other articles. On one stand belonging to Edward Becher, the group of flowers had long twining stems that could not have been fired with the flowers, but the joining was well done. There were groups of Cupids done in the same way; of course, there was not the difficulty with them as with the flowers, the figures being close together. The leather upon the covers was cut out to admit the porcelain, the meeting of which with the leather was close, very neat, and of an even flush surface. You could hardly believe your own eyes, it looked so beautiful, the dull tone of the leather and the bright colours of the procelain. I understood that those shown by E. Becher were done by a firm of decorators of porcelain, in Vienna, *Radler and Pily*, who exhibited other things. My notes on their exhibits I regret very much I have mislaid, the things shown by them being far in advance of all the Austrian decorators that have shown in the Exhibition. They showed table tops and large slabs of figure flower subjects; also dessert plates in the best style of decoration. All their things were well mounted, and they had adapted many things in porcelain to the decoration of cabinet work.

Alois Klammerth, Znaim.—I was attracted by this stall. There were excellent mugs and pots shown in common brown and white ware. The surface of the ware is covered with a brown dip, and then upon the lathe the colour is cut away in patterns (some of which are very good), leaving the white under to show the cut of the lathe. I think our common-ware makers might take a pattern from it with profit; it carried a good glaze upon it. Some of the designs you almost thought had been copied from Owen Jones's New Zealander ornaments. The same stall showed some fayence in the Italian style, very good in its way, but displaying no art.

There are two firms from Teplitz, in Bohemia, exhibiting the lava ware, as it is termed in England, and the common yellow ware with the gold lustre, as seen on the stalls at the Crystal Palace; it is very vulgar and gaudy, and no attempt seems to be made to improve it in form or decoration.

Niederlage, Porcelain Manufacturer, Dallwitz.—This exhibitor shows dinner and tea ware. The body has a grey hard appearance, but the glaze is better; and the outlines of the covered pieces of the dinner ware are very inferior, with a hard clumsy look, which properties are also possessed by the teapots. The decoration is slight and not bad. As usual with most of the manufacturers, he sends a large vase, the conception of which is very poor.

Mahren, Bohemia.—There were three exhibitors of earthenware from Bohemia, some brown and white inside, the glaze not so bad. Toilet and sanitary ware were exhibited by two of them, but they were very small. The dinner ware was very indifferent and was covered with lustre. There was an attempt at an Indian pattern on one set, which would have frightened an Indian if he had seen it.

In the same Court were a large variety of stoves (used in the German houses) made in terra cotta, of different colours, and white earthenware glazed. They are made in several pieces, and I was surprised to see how well they fired the parts and fastened them together with cement. Some of them were well designed, I should think by architects, and others were but poor in design. I wonder they do not make more sanitary ware in the same clay, for it seems to be suited for large pieces. Most of the stoves were very creditable to the manufacturer. There were three different makers of yellow ware in this Court with the black dip outside and the pattern cut out of the black; but it was not to be compared to the production of Alois Klammerth, of Znaim.

Fisher and Mige, Porcelain Manufacturers, Carlsbad.—As a manufacture in Germany, the exhibits of this firm show more advance than any other German manufacturer at the Exhibition, both in ornamental ware, and in goods for the regular market. There is one special feature in this stand. It is the introduction of what I was told was platina in the decoration, but it looks more like aluminium or oxidised silver. When it is used among the gold, it produces a good effect, especially upon some of the ground colours,—the dark blue the best. The design and modelling of most of the things are done without the attempt to do something out of the common way, which often leads to failure, and the making and finishing of the handles in the ornament department were well and carefully done, and much better than most of the potting from abroad. There were three vases shown in the Egyptian form, with an Egyptian landscape painted upon each in a quiet tone of colour, which were very good. It is a class of decoration I should like to see more of. There are some vases with a beautiful shade of maroon, amounting almost to a purple, with two shades of the same colour worked in a pattern upon it. It is a new colour to me, and it had a fine effect. The lustre decoration shown is much better in its treatment than I see attempted in England. There are several sets of dessert and dinner ware, the making of the plates and the hollow pieces of which was very good. The shapes and decorations were more like the English ware, and the price also was moderate. I think it could compete with us in the English market. There is toilet ware shown: the shapes are copies of the English—one an Indian pattern with a dark brown ground, so much used by the Germans, and another with a pale blue ground, the blue being very level in tone and decorated in good taste; the price was also very moderate for the labour upon it. Several tea and breakfast sets have the dark brown ground. It is a colour that wants careful treatment, and it would not do for any but a proficient to use it. The breakfast saucers are raised in the bottom to fit the inside of the foot of the cup. This stand altogether shows a good selection of almost all that a leading manufacturer would show, and I was pleased to see such healthy progress made.

A. C. Anger, Porcelain Manufacturer, Carlsbad.—This house shows dinner ware and déjeuner sets, but they were but indifferently potted, and are such as an English house would not send out, the amount of decoration employed being too great. There were several tureens shown, modelled after some very poor French ones, and also many other odd things which had not much to commend them. At the next stall I could not make out the name of the manufacturer, and I think it is best he is nameless. I hope the Exhibition will be the means of showing something to aim at in the future.

Berlin Royal Works.—I was much disappointed with the exhibits of this manufactory; for, with such good artists attached to the works, and not the competition of the trade to contend with, they ought to take the lead in developing new processes and productions ; but I see hardly a single attempt to do either. Almost all upon the stand had been to the Paris and London Exhibitions. It may be that the late unhappy war has stopped the production of fresh things, for it must have disorganised all industry, especially art workmanship. The most noticeable was a plain line vase, about 2 ft. high, which has not been exhibited before ; and the artist who painted the flowers upon it deserves every praise, for I have seen no flower painting in the Exhibition to surpass it. There is good freedom in the drawing, and the distribution of colour is well balanced to keep the outline of the vase. There is also a déjeuner breakfast set, the design of which, I believe, is by a German Prince, sent by him to the Royal Works to be executed. It is without decoration, is in the rococo style, and is left to its own merits of outline and modelling. I hope it will not find its way into one of the museums to guide the taste of the German potters. There are the usual large bisquet busts seen so often. The large oval body-vase they have exhibited before, with the fine figure painting upon it, the same make as the one at Kensington, except that the handles are in porcelain instead of ormolu ; the handles are beautifully modelled, and you can see the modeller has finished the clay handles upon the vase, all the markings being so keen, and no marks of a pencil to destroy the shadows. The gold is put upon the bisquet handles, and you can hardly tell it from the ormolu handles.

There are two dinner sets shown, and I think they ought to have sent something better ; both the outline and the decoration upon them being very poor. I liked the simple raised gold upon a set of vases in blue *du roi*, the decoration suited the outline of the vase ; but none of the German manufacturers have a good blue *du roi*. I think the felspar glaze is the cause. Two déjeuner sets are copies from the French in shape, but the simple decoration upon them is good. But why copy the French ? Almost all the déjeuner sets shown in the exhibits of foreign houses are copies from the French. There is a perforated dessert shown, but the design is not worth the labour of cutting. Near this are three elevated comport dishes in the Dresden style, with a lot of labour frittered away upon them, and with neither outline nor meaning. The small painted bisquet figures shown are better than those from Dresden. Some Dresden outlines shown are, I suppose, made from the moulds which Frederick the Great had from Dresden. There was a large tripod-shaped vase put on the stand while I was there, nearly 3 ft. across, with the handles in the corners of the angles. It was well painted with foliage in rich soft tones of colour, but I think it was a mistake to carry the colour on to the handles and the edge. At first sight it looked like fayence, and if the edge and handles had been finished like the foot, it would have shown the white porcelain. It was well potted, and gives us an idea of what they could do when they made an effort to produce fresh things. With it came a pair of vases, in shape the same as others on the stand, with a snake coiled in the hollow of the foot, and painted with Cupids in a panel of gold leafage, all on the white, very chaste and very good. All the fine figure painting shown is worthy to rank among the best productions of porcelain painting. A large table top, more than 3 ft. across, shows the superior talent of the artists who are employed. The stands of Dresden and Berlin were canopied with red, emblazoned with gold, and looked very imposing, but certainly were not suitable to show decorated porcelain.

Villroy and Boch, Rhenish Prussia.—It was with great interest I looked at this stand, for upon it was something quite new to me, showing the creating art of the potter in taking the commonest of earthy clays and making from it objects of rare beauty without the aid of gold or enamel colours. The pieces shown are made in a fine terra cotta; the body is buff, with a good surface, and, having a ring, it showed it had been well fired. There are several differently-coloured terra cottas used in combination, the shapes and decorations are of the Renaissance. They are very like a French modeller's work. There is a large rosewater ewer and stand, the ground colour of the rim of which is a dark sage green, and the Renaissance leafage work is raised in white upon it, and well it is done. I think the white is put in the moulds in the slip state (they are not made in a separate mould) and laid upon it; but some of the colours in the ewers are inlaid, for by carefully looking I could see a slight difference in the contraction. There is a pair of vases with two shades of the buff body, a red and a pale blue, some of which colours are used upon the surface in embossment, and some inlaid; but the taste shown in the combination of the colours and in the outlines of the vases is very good indeed, far beyond the ordinary run of new things; it was quite refreshing to see a fresh treatment of outline. Two small ornaments for jewel-stands, I think, are as good in design as the vases; all the handles and joinings are made and put upon the things very carefully. I should like to see all the terra cotta things upon this stand brought to England, for there are several workers in fine terra cotta now in England who would derive a profitable lesson from them in art as applied to potting. Nearly every piece was sold to the museums on the Continent, but I did not see that any were bought for England; for real merit these productions are far before the great bulk of fayence, which is bought daily, because it is the ware most in fashion.

M. Lehomburg, Berlin, shows a variety of insulators, made in a good, hard china body, with an excellent glaze. Most have an inside tube, and are corrugated, the bolt hole the same; but they show some without the tube. They are well made, and turned all over, and the clifting is deeper than those we now use in England; otherwise there was not anything in the make of them new to us. There were porous cells and tubes, with a white porous body made similarly to the English.

Dresden Royal Works.—It was with disappointment I saw the exhibits of the well-known Dresden porcelain; it was well-arranged upon the stand, but most of it has been seen before. There were the usual groups of figures they have made for years, very carefully done, but all small, with much labour, for which they do not make any great show. I do not think the details of the decoration upon them were as good as those on the old examples. There was a group of vases in imitation of the Limoges enamels. The dark blue ground was not good, and the enamel had a thin look with no depth of shadows upon it. Altogether it was much inferior to the other examples shown in the Exhibition. The flower painting shown upon some vases, with a Roman outline, is very good indeed. It is rich in tone, and the colour is far in advance of anything upon the stand, and displays the talents of an artist who would be an honour to any manufactory. The plates and dishes were not made and fired very well. They exhibit their perforated dessert plates, so well known for shape, the painting upon which is very good, but it is no advance upon what they have done before. There are large vases, covered with raised flowers, which make it impossible for anyone to see the outline intended, with all that kind of modelling upon it they are so fond of. I think that the Royal Works ought to take the lead in art, and not keep to the manufacture of a style long since condemned.

M. Thallmaier, China Decorator, Munich, exhibits a set of dessert-plates, with portrait well painted on the bottom, but the colours not good, and some large dishes well painted in the old German style; a large vase in porcelain, decorated as if it was fayence, but which was a mistake; and a *déjeuner* set from Limoges, the decoration of which did not harmonise with the shape. The best of these exhibits were some large slabs in porcelain, with copies from the Munich gallery. One, a copy of a Murillo, was beautifully painted, as were all the slabs. This exhibitor evidently was much better at this class of work than at decoration.

SWEDEN.

M. Gustafsberg, Stockholm.—There are two exhibitors of porcelain, earthenware, and Parian from Stockholm. These two are the only manufacturers of our English Parian body showing here. The principal ingredient, felspar, is found in Sweden, from which country we get most of our supply. M. Gustafsberg shows a number of Parian figures, some original and others similar to those made by English houses, well modelled, but pinched and contracted by the fire about the limbs of the figures to a greater degree than in the English Parian. I could account for this on seeing a broken figure upon the stand. They cast the limbs quite solid, in doing which I suppose they thought they were giving support to the figure in firing, but they are under a great mistake. The colour of the Parian is good, and carries a good surface to show the shadows of the modelling. There is an earthenware dinner set, of which the shape of the covered pieces is better than is usual, and the light blue print upon it is very good indeed; the engraving of the plate is a credit to the engraver, and the print itself is far before any I have seen from a foreign exhibitor of earthenware. There was the usual large vase in earthenware; the form was not new, and the ground colours were thin and poor. Side by side were some pieces of good design in the decoration, but next were some quite as bad as the others were good; there must be some one at the manufactory well up in decoration, judging from the examples shown, and I cannot account for such bad designs being here. There is a dinner set with a blue sprig under the glaze—a copy of one the Danes sent to the Exhibition of London in 1871, but it is not as good. There is a dinner set with an attempt at Persian form and decoration, having a raised border in Persian ornament on the edge of the piece. It had a rude hard look, and the intention was better than the execution. There are a few things in porcelain, but the decoration was not good enough for the ware on which it was employed.

M. Roostrand, Stockholm.—This manufacturer shows china, earthenware, Parian, and majolica. A china dinner set, with dark blue bands under the glaze and panels ; the gilding upon the blue was passable; the body and the glaze not bad, so was also the dark blue. Close to this was a dessert set in dark blue with birds and flowers in the panels, but the flower painting was indifferent. A china déjeuner set, with a good outline and well decorated. For a slight patter, it was as good as anything shown. There are several articles, mostly vases, in the dark, blue with white enamel flowers done in the Persian style, and some with the Renaissance ornament upon them, not bad as showing a feeling for art, but a long way from the specimens shown by the large English firms. As usual, there are the vases in imitation of the Dresden, with much labour thrown away upon a bad subject. Also some large Parian vases perforated, with festoons of flowers made by hand upon them; but the style or meaning of the design I do not think anyone could tell. The colour of the Parian is not so good as that which the other manufacturers of Stockholm send. On this stand was some really good majolica, two large candelabra and a large stove about 9 feet high, all well designed by an architect of Stockholm, and equally as well manufactured. (I see the stove is bought for Edinburgh.) I think the glaze reflects the light a little too much; it confuses the shadows of the modelling and the colours. There is a dinner set done in majolica not bad in shape, but it does not look well applied to dinner ware. This stand, like the other from Stockholm, shows articles with good and bad design side by side.

DENMARK.

Bing and Grondahl, Copenhagen.—This manufactory was formerly the Royal Works. I found part of the exhibits of this firm under the Rotunda, and the remainder in the Annexe. This manufactory has always been noted for the bisquet china figures, of which there is a large collection here. The figures covered with drapery bear looking at, but some with naked limbs were sadly pinched with the fire, and are very angular. The best things shown in bisquet porcelain were the bas-reliefs of Thorwaldsen, with coloured backgrounds. There were china cups and saucers, and plates, decorated with Celtic ornaments, which looked well. It is not often we see this style of ornament used. I suppose the Danes almost claim it as an heritage of theirs, and have made good use of it in these examples. There is a table top shown, given by the employes to their employer upon his marriage. On the centre is painted a view of the works, with a good finished border of decoration, and the legs and claws made of wood, and inlaid with bisquet rosettes and medallions. It is done with very good taste, and the top itself was the best potted table top I saw in the Exhibition. There is a dinner set shown, the same in pattern as one exhibited at the London Exhibition of 1871, with a blue sprig under the glaze; also breakfast and tea cups and saucers in the same decoration; the cups and saucers are beautifully made, the surface is marked with fine lines in the modelling, like that I have seen in a Chinese example; both are made very thin and regular, and the glaze is very good upon it. I did not see in the whole Exhibition, either English or foreign, as good an example of potting in tea ware. I see they are bought for the Bavarian Museum. I should like to see a greater number of specimens bought for the museums, showing more good potting than has been. A dessert set is shown with a perforated edge in good design, but they seem to have had a difficulty in the firing of the supports of the dishes. I think some of it is due to the making; they are pressed almost solid, from which cause the contraction is sure to be unequal, as was the case in this instance. There is a china dinner set, with a gothic outline, but the detail of the gilding is in the Louis Quatorze style, with panels of flowers. The painting is not good, and the covers to the tureens are like the top of a gothic font, but much too large for the body of the tureen. There was a dejeuner set as good in form as any I have seen, with Greek details in the modelling; the set was well potted, and the decoration chaste. I do not think this manufactory made such an appearance here as it did in London in 1862 and 1871.

There are three exhibitors of a fine terra cotta, all from Copenhagen, and there is a great deal of merit in all of them. The body is in a pale red, the shapes are principally copies from the antique; they are well thrown and turned, and the handles are carefully made and finished. The decoration upon them is in colour, with Greek frets and honeysuckles, very carefully done. Some of them have flowers of a conventional form in colour, and the painting of the flowers is very good, it did not hurt the forms of the antique vase at all. There were jugs and a pair of vases having Assyrian ornaments painted in colours upon them. The form of the vases was very suitable to the style of decoration. I was much pleased with them; nothing vulgar in the treatment of the colour, as is often seen in such things. All the forms shown were good; none of them were large, and where they had departed from the well-known shapes of the classical, it was done with excellent judgment. They asked a good price for the articles, but they were worth it.

ITALY.

The Marquese Ginori.—This manufacturer has a fine collection of porcelain and fayence, and makes a speciality of the Capo di Monti porcelain. I believe one of the ancestors of the present marquis bought the moulds from the old works near Naples, and I should think most of the things shown are from the old moulds; the potting of them is very good. There is a square box with two large mugs, having the figures, which are well grouped, raised in relief and then coloured; the colouring is done very carefully. There are several large vases in the same style, the figures on which, in high relief, are well and carefully made, and the fire has not pulled them about as badly as some of the others in porcelain: there is a large amount of labour upon them. Two large ewers shown are fine examples; and a dejeuner set, with the exception of the saucers, is well done. I think some of the Capo di Monti shown is as good as the old in the Kensington Museum, but I know it is difficult to carry in the eye such things in making comparisons.

Almost all the porcelain is well got through the kilns, which shows that there is a good potter upon the works. There is breakfast and dinner ware shown of the ordinary useful kind (not copies of the shapes of other makers), which is decorated very neatly. The china toilet ware is not so good as the other things, and is small in size. The dessert ware is very good in the potting; but the shape of the comports is not what the English would like. There is a large show made of the fayence, principally ornaments. I liked the shapes of most of them, and some are well designed. There are two large vases, with a good line, on which the coiled dolphins forming the foot do not interfere with the outline of the vase, as we often see; also some large plaques, 4 feet across, with heads modelled in bold relief in the inside; the colours are brighter than in most of the fayence shown, and the painting better than usual upon this material. The gems of the stand were two slabs painted with the Virgin and Child; the tones of the colours were very soft, and they must have been drawn by a real artist. They were much admired. A pair of vases with a pale ground looked as if there had been a white surface or coating laid upon them, and then the pattern was sketched afterwards and cut away till it showed the colour beneath; it was a Renaissance diaper pattern, and it had a good effect: in the hands of some artists it could be made very effective. There was a group of vases in dark blue glaze, traced all over with gold lines to look like filigree, but the lead in the glaze had spoiled the blue. There is a sample of the insulators made for the Italian telegraph; it seemed a pity to employ such a beautiful body and glaze for such common purposes, they being made in porcelain. All the insulators have tubes, and the bolt hole is not corrugated. The clefting at the top is very deep, and there was not anything about them superior to the English.

There is a small stand shown from a manufacturer in Pesare. The fayence is an imitation of the gobbio ware; it is rude in manufacture and very dull in colour, and the shapes of some of the vases are very far fetched and crude in design. There are also earthen dinner sets, but the shapes are a bad copy of the old C. C. ware of Wedgwood; the glaze is also poor, and the printing not very bad, but in a poor style.

Scappino Antonie, Civita Vecchia, shows a collection of terra cotta, principally copies of old Etruscan shapes. Some designs of their own are as good as any I have seen of the modern productions in terra cotta. The water bottle, with a black decoration, was particularly good in style and finish, and I do not wonder at the speedy sales they made.

Fernian Conte Hlnnibak, Faenza, showed a group of vases in earthenware, with a lustre decoration, very ugly in shape, and some dinner ware, copies of the shapes of old Wedgwood, but very rude in manufacture. A manufacturer from Savona shows two large vases and a wine-cooler made in earthenware, and decorated in majolica colours; the modelling was in the Louis Quatorze style. They looked very showy, but were not such as would entice a second inspection. A manufacturer of Umbria sends fayence with the old lustre decoration used by the early makers; he has copied the old style well, and not attempted to improve it. This stand is better than most of its class.

Monaco.—A court outside the main building of the Exhibition was devoted to this small State, and the principal exhibits are very novel fayence. Almost all the things were copies of Dresden vases, about 2 feet high, and covered with flowers made by hand, which were coloured in different shades of lustre, the body of the vases being done with fayence decoration. They had quite an imposing effect, and must have been much admired, to which the large number purchased can testify, some being actually for museums. If we consider their merit as art productions, I am afraid we are making a retrograde movement.

France.

M. Rousseau, Paris.—This exhibitor shows some earthen dinner ware in a buff body, the colour of which would suit some of those English writers upon art who have lately written about the proper colour for dinner-ware. It is darker in colour than the C. C. ware made in England, but not so clear in the tone, and it shows the sparks of iron through the glaze. The decoration, also, would suit some of the writers referred to; it is birds and flowers, painted with broad shades of colour, in a sketchy style, the drawing of which was very free; but I do not think it would do for general sale in England. The shape of the plates is not good, nor of the covers of the tureens and vegetable dishes. The edges of the plates are finished not unlike the manner in which they finish the grass-edge common plates in England. There were several articles finished the same as *pâte-sur-pâte*, but it did not look better than fayence and was not worth the making.

Jules Houry, Paris.—This exhibitor has a good stand of porcelain, applied to the decoration of metal and high-class cabinet-work. He exhibits some good effects, chiefly noticeable being some slabs of porcelain let into jewel-boxes and the tops of tables. The slabs are modelled with stems and leaves, in low relief, and then covered with a beautiful blue glaze; the colour is wiped off the high parts of the modelling, and looks as if the light had fallen across it, and the blue falls into the shadows. It must not be compared with the majolica made in England, which is similar in treatment, for the tone of the blue was bright and pure, and the design suited the purpose. It gives us an idea of what good things can be done without much labour. There is a flower-pot done with a dead-black ground, on which is modelled a simple spray, twining round it. It is well designed, and the spray is covered with the same blue. The unusual fresh appearance which it had added to the advantages of its make. There is a porcelain slab, about 22 inches by 10 inches, in a panel, with a female figure, representing painting in porcelain. The conception of the subject is very good, and tells its own tale; and the painting of it is beautiful. A cover of a small box, with a landscape painted on it, in different shades of blue; the colours are good, and the glaze the same. Also vases shown in fayence, of which the handles are in ormolu, and the glaze and colours are richer in tone than most of the fayence shown; it also did not look so earthy. I should like to see the English use their decorated porcelain in objects of use more than they do; for this exhibitor shows what can be done with it.

Geoffroy and Co., Department Loiret.—This firm shows a large collection of fayence, in all the styles of the old makers. There is a dinner set done in fayence, painted and filled in; it is not very remarkable, and the price of it is higher than the English. There are some common printed plates shown, with a poor gray glaze upon them. A pair of pilgrim bottles, having some *pâte-sur-pâte* flowers raised, and markings of the pencil upon the surface to imitate the crackled ware. There is no novelty in the shape of anything shown. The best are a set of vases, with the white ground done with *pâte-sur-pâte* birds and flowers; the drawing of the birds is very good. There is an ewer and stand, with some figures painted upon the body; the outlines of the figures are done with lines of gold, and then filled in with colour in the ordinary way; it is bought for the St. Petersburg Museum, and has realised a good price.

D. Vion and Baury, Paris, show a good collection of porcelain figures painted upon the bisquet. They are almost all in the Watteau style of costume, made very attractive to the eye with the colouring, and the style of the figure takes off any defect in the firing. There is a Venus and Cupid done as a statuette, but the joinings of the limbs and the seams of the moulds are very bad. They have made the joinings of the limbs at very disadvantageous places. The best figures on the stand are two large life-sized Cupids, one veiled and the other with arrows. The bisquet porcelain is excellent in colour, and carries a good surface; the joinings do not show so badly as in some of the other things. There are some large busts life size in bisquet, which are well fired, without that pinched look we so often see in this ware. The vases shown are not new either in shape or decoration.

Thierry Poulin, Paris.—This stand has a small show of porcelain and earthenware. The porcelain dessert set is very well made, and is decorated somewhat in the English style. If it was not for the body, I should have thought it had been English. There is a grounded band of colour, and on the bottom of the plates are birds and flowers, the painting of which was equal to the average of the same kind that we see in England; but the price was high. There were shown some cups and saucers decorated in the Raphaelesque style, very good indeed; also a dessert set made in earthenware, the plates of which are made very well, better than we usually see; the whole is decorated with bold free drawings of birds and flowers, and is not too dear. All the exhibits of this stand are very good of their kind, and there is not that crowding to make a show.

H. Boulenger, near Paris.—This stand is filled with fayence, principally in the Italian style. The colours are bright and clearer than most to be seen here, but there is nothing new either in design or decoration, other than what we have seen so often, and they are mostly reproductions. There are also some printed plates, the engraving of which is well done, but not good in the design. However, the cheapness makes amends for the defects. Toilet ware is also shown, but the prices of it or its appearance will not hurt the English. There are several good things with Persian decoration and the *pâte-sur-pâte* upon the earthen body.

Od. Hache and Pepin, Sahalleur, Vierzon.—This firm sends nothing but porcelain; it is by far the best stand of porcelain sent by France, and comes up to our notions of what to expect from her. There is a dessert service very chaste and good in the decoration, but the shape of which the French must be fond, as I have seen it at three of their stands. A dinner set shown with the oval shape covered pieces is very good; the body and glaze are splendid, and all the pieces are well made and fired. I see the dishes are longer and not so wide as ours, but they look well, and are, I think, better than the oval shape we use. There are some vegetable dishes shown, smaller in size than the English, and with coloured grounds upon the covers; I have not seen colours at home which could compete with them for depth of tone and levelness. The shades of colour were different to those we see so often in England. There was a maroon with a purple cast in it (but not with that washy look which we get in England), and a pure light green, but solid in colour. At first sight they looked as if they were under the glaze, and attracted much attention, as well they might. The knob of the vegetable dish was a rose knob covered with gold, and burnished all over, but it very much detracted from the decoration upon the dish. One of the vegetable dishes was decorated with Persian ornament upon a turquoise ground, and for real decoration I have not seen anything to surpass it—a dinner set done with that decoration would be something to remember. There was a dessert set with large, flat, oval comport dishes having perforated edges; the design of it was good Renaissance, and it was beautifully modelled and made. I must not forget a dejeuner set in pure white china mounted in ormolu; the surface of the pieces was covered with fine lines of modelling, similar to what I have seen on the egg-shell ware of the Chinese; the glaze upon it was very level and transparent. There is a beautifully shaped cup and saucer, with four panels in the line of it and fine fluting; it is a fine piece of potting. There are two vases with ormolu handles, the lines of which are very bad, and the decoration not such as I should have expected, judging from the workmanship displayed on the other exhibits shown on the stand. Altogether it was a relief to see this stand with good porcelain upon it, after seeing so much of the fayence with the dull body and colour, and not half the merit in the manufacture of it as this porcelain.

M. Leon Parvvillee, Paris.—This stand has nothing but large plateau dishes, about two feet across, made in fayence, and with a large amount of labour in the decoration. The patterns upon them are slightly raised with the pencil, either by *pâte-sur-pâte* or enamel glazes. The Persian style of decoration prevails most, but there are some done in the Arabian and Turkish; and the decoration has not the appearance of being copied, but looks as if designed for the piece in these styles. I do not see the wisdom of so much labour being bestowed upon so poor a material, which is the case in a great many subjects displayed on this stand. There is a coffee-pot made in the Persian shape we see in metal. It must have been difficult to make and fire, but it was well done. It was decorated, of course, with Persian ornaments.

M. Saurin, Bourgle Reine.—A small stand of fayence, and among it some dinner ware in the same material, with birds painted upon it in a blotchy style of free-hand so much admired by some people; I do not care to see it upon a dinner table. The outline of the tureen was good, better than one often sees. Some of the small pieces of fayence were sold to the Museum at Edinburgh. The colours are not bad, but it has a bleared look about it, and I do not think many would wish to copy from it.

J. Brianchon Aine, Paris.—This is a stand of small porcelain ornaments and figures covered with lustres; there are few things among them which have not been seen in the English market. The best thing in the design is the grouping of three large shells, and the adaptation of coral for the handles. There are some very curious designs among them, but they seem to suit the lustre decoration. I find they ask quite enough money for the articles.

E. Collinot, Paris.—This exhibitor shows a splendid collection of fayence worthy of the name. The columns on which the covering of the stand is supported, the frieze, and some of the side panels were made in fayence. The large vases made in the Persian style are well designed, and suitable to the decoration put upon them; some of the relief is modelled upon the surface of the vases, but most of it is worked on with the pencil; some in the clay state, as *pâte-sur-pâte*, and some with thick enamel glazes. All the colours are very clean and bright, and are quite a relief to the eye, after seeing so much of the Italian style of fayence. On the back of the stand are two panels about five feet long, made with tiles fitted together and painted with Persian foliage, a fine example of decoration. There are some tiles with raised modelling upon the surface, more like the old Moorish tiles of Spain than any I have seen ; I almost think they are copies. They have a good appearance, and are different to the ordinary look of tiles. This exhibitor seems to have mastered the difficulty of the crackled ware of the Chinese, for there are slabs shown crackled all over, which would be difficult to tell from the Chinese ; I do not see the use of it for decoration, except when applied to the imitation of the Chinese vases. All the things shown upon the stand are on a large scale, and were all very good specimens of decoration and potting.

M. Deck, Paris.—Of all the exhibitors of fayence, M. Deck has done most for the advance of real art. His stand was the admiration of all who made a careful study of it, and every praise must be given to him for his encouragement of art, and for the beautiful results of his labour. I was pleased to see the names of the artists who had been employed on the work shown, hung upon the side of the stall. When shall we see that done in England ? The vases exhibited were not too large, so that the eye could take in all the details of the decoration with ease. The most attractive were several large round plaques, about 2 feet across, painted with large female heads, and other decorations. I saw one of them was bought by an English manufacturer. The price paid was £200. Here is an example of art workmanship ! This dish, which realised such a large amount, could be made and sold by the gentleman who bought it, for about two shillings, and the artist with his labour has made it worth £200 ! The real alchemist must be the Artist, for he seems to have the true philosopher's stone. I am glad the dish is coming to England, and pleased at this instance of an English employer having such a love of art. There is a pair of cylinder-shaped spills, on which birds are painted ; the drawing of the birds is in a superior style. I have not seen anything to surpass it. As far as I can judge the colour and the glaze is all one. I would call it coloured enamels, with a powerful flux in it to form the glaze. The colours are different from the English majolica ; the glaze of which is transparent, and shows the colour ; but in this case the colours look more opaque and solid, while the surface carries a good glaze. The method of work seems to be laying the ground colour of the design first, then taking away the parts to form the design, and filling in with the colours wanted. The colours in some examples were raised up as high as three-sixteenths of an inch, and the white grounds laid upon some of the pieces looked like glazed porcelain, from the purity of the white. There are two plates painted with swallows resting on a telegraph wire; they have a comical appearance, and they look very happy together. There is a vase with Persian ornaments very finely traced in black upon it with a pencil, in low relief, and then covered with a turquoise green glaze; it had flown very equally indeed, and showed the tracing under. It had a charm of its own I shall not forget. There is a broad jar with elephants heads for handles; but to give a description of all the gems of art shown at this stand would take more space than I have to spare; but to know that the white ground of the plates with Persian flowers was not the colour of the body, but the enamel glaze, was very striking, and showed that M. Deck had not followed the rule of thumb in the composition of his colours, but had made science to be a handmaid to art, and combined both to aid in the most promising results to the potter's art. I hope M. Deck will meet with the success which his skill deserves.

SPAIN.

Messrs. Pickman, Seville.—These manufacturers showed good promise of progress at the Paris Exhibition of 1867, but the show here is very limited in comparison, owing, I suppose, to the disturbed state of the country, which must be a sad hindrance to the development of any trade requiring capital and study, and these the manufacture of pottery must have. There is a large vase in the Rococo style, with lustre in the ornamentation; but it is poor. The dinner and toilet ware is indifferently done, the engraving and printing is about the same, and the shapes are copied from the English. I was sorry to see so poor a display from this manufactory, and hope better days await the potter's art in Spain. There were some coarse brown and buff water-bottles shown from Barcelona, but they were indifferent in form and make.

PORTUGAL.

Pinto and Tilho's.—This is the first time I have seen porcelain from this country, and the manufacturers have tried to make a display, but they had a limited supply of art to bestow upon it. The tea ware was hard in outline, the toilets were English shapes, the glaze had a gray look, the potting and the firing were not good, and the decoration was very slight ; but I was pleased to see Portugal making a start in the trade. M. C. G. Mafra shows some earthenware, but the shapes are bad, as is also the engraving of the prints. He shows majolica after the Plassy style, but not good ; also common yellow ware, with the very best colour of yellow I ever saw, and the glaze upon it was also very good.

ENGLAND.

Messrs. Jones and Co., Stoke-upon-Trent.—This house has made a special feature of the majolica ornament. There are several good designs in the modelling, but no trying to do large attractive pieces. The articles in majolica are all well made, but the colours seem to lack the brightness of tint which some of the foreign makers show ; there is a look about it as if the fire was too much for the colours, but not for the glaze. The class of articles made by this house is very suitable for the general market, and the price is more within the reach of ordinary purchasers. Most of the English majolica is differently treated than the Italian in its decoration, which is more artistic, with plain surface (either vase or large dish, &c.), and the design of the decoration is painted in different colours upon the surface of the piece, so that it takes a good draughtsman to do the colouring of it : but in the majolica exhibited by this firm, and most of that made in England, the design is in the modelling, and the relief of the modelling is the guide for the floating on of the coloured glazes. The colours drop into the hollows of the modelling, and give a deeper shade to it. This method of colouring majolica, not requiring skill, does away with the artist workman ; it may not be so artistic, but it enables it to be sold much cheaper. There is a tripod stand about three and a half feet high, with a vase upon it, very good in design, and well made ; also some pilgrim bottles and large plaques, all good in this style of production, and a great variety of other articles suitable to the adornment of houses of moderate dimensions. This firm also shows a good collection of earthen toilet ware, of which I was glad, there being very little in the Exhibition ; and that shown by the foreign houses being either small in size and bad in shape, or made in china, and decorated to a great extent (often with not much taste), and, of course, dear. The ware shown by this house is good ordinary selling articles, decorated simply. It does not offend one's taste, and the price is very reasonable.

Brown, Westhead, T. C. Moore, & Co., Cauldon-place, Hanley, Staffordshire.—This manufactory shows a variety of articles in china and earthenware ; also in sanitary ware, for which they are famous. They make no attempt to show large exhibits, and all shown would give a foreigner a good example of first-class productions of everyday sale. The china dessert shown, with an ornamental foot under the comport, could not, I think, be surpassed either for design or the way in which it is brought through the kilns. It is an everyday production of this house, and may be seen in most shop-windows in England. There was a dessert plate shown with a beaded border, and one with leafage upon the shoulder, as neat specimens of what dessert plates in china ought to be as any to be seen, not being produced at a large cost in the making, as some of the dessert plates are. I saw a good specimen of enamelling upon the dark blue, after the Limoges, a good example for a house not making it a speciality. The earthen dinner ware is good in shape, and not overloaded with decoration to destroy the outlines of the covered pieces, as is too often the case. Toilet ware is well shown here ; one new-shaped ewer, with a rope handle over the top, was very good and acceptable, there is plenty of room for a new shape in toilet ware, for one shape of ewer is shown by most English houses, and about six of the exhibitors from abroad have copied the same. There are a few specimens of majolica shown, not in the Italian style, but more for their form, which is good in design and modelling. The sanitary ware is just the thing to show at Vienna ; it is much needed there. There is a top to a washstand, made with the bowl, and soap, and brush trays, all in one piece—not an easy thing to make and fire ; it is decorated with gold, but the design of the gilding is not suitable to such a surface of white. In all their various shapes, sanitary utensils are shown ; they are not very attractive to the eye, but of immense importance to England and to the English potter.

Messrs. Copeland, Stoke-on-Trent.—This well-known manufactory has made itself a name at all the Exhibitions for first-class art and decoration. In statuary porcelain it led the way in the production of Parian as a new development of the Pottery Art, and the statuary still produced by this house is such that it will hold its own against all competitors. There are two busts of females shown, and the tone of the material and the way they are manufactured cannot be equalled by anything shown in the Exhibition in that line. They did not look as if they had been through a fire and were once in a liquid state, and they looked very solid and compact in texture. A large vase made in china with Cupids supporting it for a foot, is a fine specimen of china potting; it is decorated with flower painting boldly treated. I think I have seen this artist to better advantage in some of his other productions. There are two pairs of vases with an egg-shaped body, very good in form, shown with different handles (that lying flat upon the line is the most suitable), and the flowers are painted upon them in such delicate tones of colour that they seem to be reflected lights. There are several vases modelled and decorated in the Japanese style, of which Messrs. Copeland's artists seem to have their own treatment, not making a slavish copy of a vase from Japan, but using the Japanese style for the realising of their own ideas. A large, flat, oval vase, with the dragon upon the neck, raised birds and flowers on the body, and the sides perforated, is a good specimen of the designer, and shows that he fully understands the style. There is a dessert set designed in the Chinese style, painted in the centre with birds and flowers, and the design is good and true to the style. A dessert set in china, with Parian figures for supports to the comports, is good, showing the combination of the two materials. A large vase, with panels upon the pedestal, and having tinted celadon ground; the painting of the flowers is beautiful, and the treatment of the serpents on the handles very good. Toilet ware in earthen is shown with sound decoration upon it, of which the eye will not tire; it is suitable to the requirements of all households in price and taste. The majolica shown by them is so good that I cannot make any comparison between them and those of the other good makers in England, to which it is so near in excellence.

The Royal Porcelain Company, Worcester.—These exhibits are from the well-known manufactory at Worcester, which earned itself a name before most of the present manufactories were in existence. As regards its productions in high art, a comparison of its present exhibits with those it exhibited in the Exhibition of 1851 would show that they have made great progress and advance in the past twenty years, and I think they have fairly earned themselves a name for several specialities which they have made almost their own. In this Exhibition they show a fresh application of another style of art to the potter's list, in what they call "Japanese ivories." It seems to be the impression of many that they have been copying the Japanese porcelain in their productions, but in all the Japanese exhibits—and they show largely here—I have not seen anything that would at all suggest the designs for these specimens. The artists who designed and decorated them seem to have thoroughly mastered the style, and imparted to their designs that subtle feeling for art which the Eastern nations seem to alone possess. That they intended to be well represented is proved by their exhibiting nearly a hundred different articles. The designer has taken a Japanese form, and on it modelled in low relief the decoration, the modelling being done with the greatest care, to preserve its keen, fine lines. All the ware was very carefully made by the potter, for if it had not had that care bestowed upon all its details in every process, it would be anything but what it was intended to be. The colouring of the relief is done with great distinctness; the colours are more opaque than those ordinarily used, and almost all the plain surfaces are covered with the tint of ivory, with a good tone, and almost the texture. Some of the feet and supports are coloured to look like bronze and other metals, and all that sharpness of outline which the metal shows is well preserved in these examples—one could hardly believe it was not metal, instead of porcelain—which shows that a great deal of care and labour must have been expended upon the work. I can only mention a few of the things that struck me as showing good potting as well as good design and decoration. A pair of tusk-shaped vases with the frog story done in bronze and colours, and the same line vase with gilt storks, perforated. I think the perforated ones realised the ivory look as well as anything shown. A pair of pilgrim bottles with gold ground, and pottery subjects done in bronze upon the surface, were excellent. There are a set of vases with the decoration in relief, to illustrate the manufacture of pottery as carried on in China. The figures have a quaint, comical appearance, especially the thrower on the wheel, and one almost wishes to form his acquaintance as a brother in the potting art. A pair of cylinder-shape vases with ivory ground, bronzed and gilt, with coloured birds, and a large plateau pierced, on which are subjects in coloured bronze; also a pair of figures of a Japanese lady and gentleman, of which all the details of the fine modelling are well preserved, both in the making and in the rich decoration of the garments, which is done in colour well kept in subjection to the general contour of the figure. Altogether, it is a real treat to look at the skill and fancy displayed in the production of these "Japanese ivories." One end of the stall is occupied with figures, &c., described as "terra cotta with Persian turquoise," which is used as a decoration upon the drapery of the figure. At first sight it is almost a shock to the eye, two such strong contrasted colours, red and blue, meeting without any medium to tone them down. The figures made in this kind of decoration are far better than those formerly produced by this house,—in fact, are a much better class of figure altogether. A statuette, "The Bather," is the best I have seen of their production, but would much prefer to see it in Parian. There is a large "Guardian Angel," with the flesh parts in terra cotta, and the large wings and pedestal covered with different tints of the blue. This, I think, is not many degrees removed from the vulgar. A pair of large Grecian "Water-Carriers" is very good in the modelling. They are also shown made in a (Plain C. C.) body, and I must say their beauty is best without the adornments of the blue and red. I do not think this class of decoration will be permanent in the trade. This manufactory has long held a name for the beautiful imitations of the Limoges enamels, which were brought to great perfection by the late Mr. Bott, whose death was a loss to this class of art. Some of Mr. Bott's best productions are now upon the stand, but they are all well known in England, having been exhibited at the 1871 Exhibition of London. I see they have still an artist following this style of art,—an ewer, with Cupids in enamel on the blue, showing a near approach to the late artist. There is a pair of vases painted with subjects after a French artist. The figure painting is well done, in very good, pure tones of colour, and is finished with care in the details. The shape of the vase is the best upon the stand, and is well fitted for the decoration put upon it. A small triangular inkstand in Parian, with Raphaelesque decoration. The embossment is traced with colours, and harmonises well with the soft tones of the glazed Parian. The dejeuner set given by the City of Worcester to the Countess of Dudley is shown as an example of their jewelled porcelain. It has been exhibited in England. I must mention two teapots with pale blue linings, as good specimens of perforated porcelain as I have seen. The making and the firing are very successful, and they are chastely finished with fine lines of colour on the geometric ornament, and have a good effect. There are some good examples of rich coloured glazes like the Japanese. A jug with dragon handle, plum body, and turquoise, is good, as showing this class of decoration. A large quantity of the things shown are bought by distinguished persons, and for several of the museums upon the Continent.

Messrs. Wedgwood, Etruria, Stoke-on-Trent—The coloured jasper ware shown by this house has great charms forpotters, charms that a dilettante can never know, because he does not understand the technical difficulties to be overcome in the production of it; besides the articles and the decoration of it are wholly done by the potters, and all its effects are the results of one firing, which is very different to the manner of producing high-class china, it having to depend for its decoration upon so many and different degrees of fire. Most of the coloured jasper shown, I think, looks brighter than the old examples in the Museums. I do not see many shapes of vase, &c., shown, but what I have often seen before. There are two vases, with white grounds and coloured festoons upon them, which have a good effect; but with the command of such wonderful bodies and colours, it is to be hoped that some fresh application of them, beyond the reproduction of the old shapes, &c., will be attempted. The larger vases shown are fine pieces of potting, and equal to any of the old. I saw a reproduction of the speckled, or mottled vase, at Kensington Museum, but I do not think the effect is obtained in the same manner as in this copy. A large table top, shown in the Henri Deux ware, is a new manufacture of this house, and is a fine specimen of that class of pottery, showing good art in the treatment of the difficult and intricate inlaying of the fine lines of colour composing the decoration; it reflects great credit upon all who were engaged upon it. Upon the table is a set of chess-men, supposed to be modelled by Flaxman, which gives great interest to them from the high place he occupied in English art, and the connection in early life which he had with Josiah Wedgwood, and the improvement of English ware. There is very little of the black basalts shown. I wonder at that, and should like to have seen more; for in this they are unapproachable, and could show very good examples. There is a good show of the fayence ware, in which this house has, of late, taken great interest; it is after the style of the Italian, depending upon the art decoration for its value. There are figure subjects done in colour, with a sketchy kind of drawing to them; and it is a great relief to see the colour of the body they are done upon, after seeing the muddy-coloured bodies of most of the foreign fayence. A few of their portrait-medallions shown, with the outline of the face well defined by the coloured background; with our progress in potting, this branch of art has not been used so much as it ought. In ancient times a similar method was made use of to preserve the features of the old worthies.

Messrs. Minton, Stoke-upon-Trent.—The magnificent show of ceramics exhibited by this house certainly surpasses anything shown by an English house in any exhibition. From the Exhibition of 1851 to the present, there has been that steady progress shown in the development of all their different classes of production to which England is indebted, in a large degree, for the high position she holds in the potting art and trade. Artists from all countries have always been encouraged, and there has not been that neglect of the native artist shown which is often the case. The results of this liberal patronage of art are well illustrated upon the stand in this Exhibition, and show the experience and knowledge of our twenty years of progress. It is the admiration of all the English who have seen it, and who know the excellent productions of this firm, and is a great surprise and wonder to foreigners. One hardly knows where to begin to note the most striking among so many praiseworthy productions. There is a specimen of the Henri Deux ware, a barometer and clock stand, about 2 ft. long, to hang upon a wall. I do not know whether it is a copy of an original one, but it is a fine production, showing a vast amount of the minute and delicate lines of inlaying in colour ; one could hardly expect that a private manufacturer would undertake such a piece of work with any hope of profit, the labour bestowed upon it being so great ; I am glad to see it is sold to a real patron of English art. A candlestick, copy of the one in the Kensington Museum in the Henri Deux is shown ; I should like to see the two together, for the difference is so small that I do not think it could be detected. Two large vases, with blue *du roi* grounds upon them, and panels of painting on each side—one a landscape, the other a figure subject ; the artists who painted these show what Englishmen can do if they are properly trained and encouraged in art. For good sound painting, without any tricks of art, they are not surpassed by anything shown in the Exhibition. The vases are sold to the same Englishman that bought the Henri Deux. The *pâte-sur-pâte*—made by this house as early as any in England—shows the advance they are making in this difficult branch of manufacture, for in the production of it there are great difficulties to overcome, the labour of none but artists being required to produce it. There are some large vases shown with this decoration :—the white *pâte-sur-pâte* is done upon differently-coloured grounds ; the grounds with the dark tones of colour are so rich, and yet so soft under the glaze, and the shadow of raised white so delicate in gradation of shade, that the great difficulty to overcome is to produce the darkest shades of Parian, and in keeping the delicate white upon it without getting a stain from the black by the action of the fire, it is well managed. The coloured celadon in Parian is well shown. There is a large piece for a centre, with a fine design and modelling that would demand no ordinary care in making and firing, and the colour is kept equal in tint all over. A candelabrum in the same material

—not an easy thing to make, and the difficulty well got over, also two Parian figures and large vase in celadon, with drapery the same, are fine examples of this class of coloured bodies. Two large pilgrim bottles, with flowers painted upon a pale green ground, are fine specimens of flower painting, as applied to porcelain; indeed all the flower painting shown on this stand is equally good, and the effects got without any tricks of art. Two large vases, blue grounds, on which are storks and flowers, and bronze on the feet, are very fine in conception, and in all the details of manufacture; but to name all the different classes of decoration shown, would require much more space than I can give. The Persian style is largely shown; it is very beautiful, and lends itself well to the bright colours and glaze of porcelain, and is capable of either rich or slight decoration as required. The examples shown of the turquoise blue, which this house has made its own, still stand the tests of fashion, and are pre-eminently the best shown in the Exhibition. The earthen dinner and toilet ware made by this house, and well-known in the English market, is shown, but, taking your eyes from the bright colours and decoration of the other articles upon the stand, you cannot fully appreciate the simple but good decoration upon these. There were several samples of china dinner plates, the decoration on which was a good example of what should be employed on china dinner ware, and there was that absence of misdirected labour which often confuses the eye at the expense of the design. A cup and saucer, with a rose adapted to the shape of the cup and the foliage to the shape of the saucer, is a very difficult thing to treat well, but in the hands of a good designer it does not present that torturing of nature we too often see, which the one shown here is free from. It is also quite new. The majolica made by this house has obtained a name at all the Exhibitions, especially that of 1862, where they showed what they could do in large pieces. The pieces shown here are not as large as some they manufacture, but are more suitable to the requirements of ordinary use. I can see progress has been made in the shades of colour used; the colours look more solid, and the shadows of the modelling are not confused with the different shades, as often seen in English majolica. Specimens of this manufacture are placed in several prominent parts of the Exhibition as aids to its decoration. This stand is the best I have seen, and they have mastered the imperfect lighting of the nave by keeping the covering of the corner stands well in height. The disposing of the different colours of the exhibits to aid each other was perfect.

GENERAL CONCLUSIONS.

As regards the Government manufactories, I do not think Dresden at all occupies the position it ought to. I am afraid they have increased the producing power of the works more for commercial purposes than for the development of the ceramic art, than which we expect something different from such works. The Berlin works do not keep up to the good name which they held at the Paris Exhibition of 1867, where they came well to the front, and showed good things worthy of a Royal Works; but we must make some allowance for the late war interfering more or less with their productions. The first place among these works exhibiting at Vienna is due to the Royal Works of St. Petersburg. They show more advance, not in the production of anything new to the trade, but in the quality of the work shown. The decoration is better than the forms of the pieces, and there is not that elegance of outline which there might have been. However, they deserve credit for the great striving which they seem to have made to advance their reputation as a Royal Works. We miss here the fine exhibits of the Sèvres Works. The potting art can ill spare the beautiful and elegant productions which used to be so great a feature in these Exhibitions, in many instances their examples being used by ceramic manufacturers as starting points for fresh productions. The capabilities of France in the manufacture of fine porcelain are not at all represented here, for the Limoges manufacturers do not show their fine potting, which was the admiration of all who saw it at the 1862 Exhibition. France shows its pre-eminence most in the fayence of Messrs. Collinot and Deck, which is certainly unrivalled.

The Austrian and German porcelain does not come up to my expectations, which were based upon the advantages they possess of technical and scientific education. Exception must be made of the exhibits of Messrs. Fisher and Mige, of Carlsbad. If in the future this manufactory makes as good advance as the present Exhibition shows, they will be able to take a good place in the production of porcelain. There are great contradictions shown on most of the stands from these countries; side by side are to be seen good and bad designs. They fail most in the forms of outline, and do not show that taste for harmony of colour which I should have expected. It seems to me that there is a want of a directing artist to superintend the production in all its processes. I think Germany has advantages in the manufacture of porcelain, which, if well developed, would give them a share in the commerce of the world. I do not see any advance made by either Sweden or Denmark on former Exhibitions. Spain we must leave out for the present, but I am glad to see Portugal makes a start in porcelain manufactures. Italy I do not think has made much progress in bringing out anything to add to the list of new styles of production, but what they do make is kept up to its previous excellence.

If the Japanese still go on in the porcelain manufacture, as shown at Vienna, real Japanese art will only be found in the museums of Europe.

In my progress through the Exhibition, according to the arrangements, I began with the Eastern nations; and after looking at the foreign exhibits of pottery, I was much impressed with the general excellence of English ware, all the forms, with few exceptions, being very good in design, and the decoration free from all pretence and bad taste. One did not see here good forms and decoration side by side with bad. The work looks honest, with art principles ruling it, and not the chance production of an individual trained in one part of the process, while the other parts are left to chance, but the ruling head directing and controlling the articles both in form and decoration.

I should have liked to see more shown of the general useful ware which has enabled the English to command the markets of most countries, and to compete against almost prohibition tariffs. This exhibition will not give foreigners an idea of the immense manufacture of pottery which has developed itself during the last few years, indeed it does not show the productions of scores of manufactories. That there is great progress being made can be seen by anyone who recollects the productions of the smaller houses, some of which, in domestic articles, are almost equal to those of the large manufacturers in potting and design; but I am afraid it is too often done at the expense of the large houses.

I have no fear at all for the future of the potting trade of England, if our rising workmen will only submit themselves to be properly trained in art, and take all the advantages they can of technical and scientific education. With the magnificent collection of ceramics at South Kensington, to show the success of past productions, we ought to be ever on the move, endeavouring to gain a still higher position in art, and not forget that this Exhibition has shown foreign makers where they are deficient, and that every effort will be made by them to profit by its teaching. I know the Germans are quite aware of their position in this Exhibition, and that every encouragement will be given them by their country to enable them to compete in the markets of the world.

Visit to the Dresden Royal Works.—On my return journey I had an opportunity of paying a visit to the Dresden Royal Works. They are situated on the left bank of the river Elbe, about twelve miles below Dresden, at a small town called Meissen, formerly the seat of Government of the King of Saxony, before Dresden was made the capital. The river is very picturesque, with bold hills on each side and lateral valleys opening out, mostly all well wooded or covered with vineyards. The castle and a fine old church overlooks the river. There are some good details of florid Gothic about the church, but some of the restoration of it is no better than they used to do in England when the churchwardens were the architects. The manufactory was situated in part of the old castle till within the last few years, but there is now a new manufactory built, not far from the castle, in the bottom of a small valley that opens out to the Elbe, and is overlooked by vineyards on each side. The buildings are plain and substantial, in the plan of an oblong, with openings from passages to the different rooms, which are lofty, well ventilated, and heated with hot water. I was much pleased with the appearance of the men employed,—they looked intelligent, of good social position, and there were many middle-aged men among them. I did not see much of the decorating, for I concluded that the process would be the same as in England.

The works employ nearly 600 hands; a few years since they did not employ 300. I was much interested in seeing the process of manufacture, as it is different in several respects from the English. I think in the manufacture of porcelain they have advantages over us. The materials of the porcelain body is found near Meissen, and it is washed on the works (almost in the same way as our china clay is washed in Cornwall). It has the appearance of being of a loose sandy nature, almost like the Cornwall stone when pounded up without crushing the particles. The fine particles are floated away, and carried with the water along a series of spouts till deposited into tanks of slate, where it remains till it settles down, after which the water is gradually drawn off. The thick slip is then put into bags about 2 ft. long and 18 in. wide, which are then laid on their sides upon wooden hurdles plaited with wicker-wood. Several layers of hurdles and bags are put upon each other, a flat board is placed on the top and a screw is brought to bear upon it gradually, till all the water is squeezed out. The clay is then ready for tempering. The clay was a very good clay for the potter's use; it worked very free and clean in the hands of the throwers. An English thrower would call it good for working, much better than many kinds of the English china clay. The plates and round dishes are made upon the thrower's wheel, as we used to make them in England fifty years since, and are then blocked upon a mould on the wheel, the foot upon it being worked with a roll. When it has left the mould it has to be hardened and the back turned on a wheel, to give the finished outline to the foot. I see the bottoms of all the plates and dishes are raised up about a quarter of an inch, to allow for the dropping in the firing of them.

Another man does the finishing of the edges of the plates and dishes, for there is a clear waste upon the plate of half-an-inch, level with the edge, and that has to be cut away with a knife and finished. The figure makers have their labours divided. There are persons to do the pressing of the figures—the clay worked very well. The figures are all made very thick, and the bodies of some of the figures were all pressed solid ; and to get the moulds close, they were put under a screw-press. The parts of the figure are then taken to the finishers, who have to go over all the surface with their tools, and every fold and embossment is retouched ; it was a great waste of labour. The moulds were all very dull, and the lines of the fine drapery hardly to be seen. One half of the labour would have been saved in England by keeping the moulds good, and the work as it left the modeller. I do not think they cast anything.

The plaster of Paris used for the moulds seemed very hard, with a gray look, and heavy in its gravity. The cottles used by the mould-maker were of a very rude description, and those for the square moulds were made of plaster-bats fastened at the corners with twisted wire ; the plaster seemed to take a good finish.

The raised flowers made by hand are done in about the same manner we do them in England. Having manufactured these things so many years, I expected to see better work than I did.

The figures are burned the first time, laid upon their backs, with short props dipped into ground quartz, that would answer the same purpose as our ground flint, as the composition is almost the same. The kiln is divided into two parts by a low dome about 6 feet high, with a hole in the centre, of 2 feet. The clay ware is placed into the bottom part and the glost above, and all the saggers are looted. The fire-holes are all smaller than our kilns, and they take more care in excluding the rush of air into them. The ware fired in the bottom part of the kiln is hardly out of clay, and has not done scarcely any contraction ; it is as porous as an earthen piece in the bisquet state.

It is afterwards dipped, and the glaze being in a very thin state, the dipper gets it on the piece very equal and thin. They do not use a wash for the bottoms of the saggers, but a thick bat of sagger-clay, with a deal of sand in it, and it seems to answer the purpose well.

From this it will be seen that the piece of ware has to do almost all its contraction in the second burning with the glaze upon it, and with no support at all, which is not the mode in England, where it has to be supported during contraction. They told me the contraction was one-sixth; but, from what I saw, I should think it about one-eighth. The glaze is composed of felspar from Norway, good clear quartz, and a limestone of a bluish grey colour before it is calcined. In the grinding of the materials, the stones move much slower than they do in England. I saw that they used turned rings to keep the edges straight in the first firing, which I should think is almost useless, seeing the small shrinkage which the first fire makes on the pieces. They have, however, this advantage, all the damaged pieces and the rings of the first fire are ground up again and used in a certain proportion of the clay, which, no doubt, helps to stop any dunting in the second burning. The clay with which they make the saggers is found in the neighbourhood of Meissen; it is not a fire-clay like we use, but more after the nature of a ball-clay. They use the ground grog and a sand mixed with it; I could see small particles of iron in it, and I should think it gave them trouble at times, but the outside of the saggars did not look as if there was much flame and sulphur from the coal used. They get their coal from Bohemia; it is of a very dull-looking black, and the cost must be considerable from the distance it has to come. A great deal of their decoration seemed to be done in bisquet blue under the glaze. I saw several working upon it; but not having time to spare I did not see much of it. I looked through the show-rooms; they were well stocked with articles of everyday sale, not at all what I expected to see from a Royal Works. Some of our English show-rooms show much better articles, and there was such an absence of high-class decoration that I may with truth say it to have been more like the productions of forty years back than of 1873. It was a well-regulated works; everything seemed in order; the rooms clean, and no one in a hurry to get their work done; working with them did not seem such a serious affair as it does with us. I was much pleased with my visit, and should have liked to have spent a few hours in the vicinity of the town of Meissen.

Stationary Engines.

By CHARLES A. PERKIN (*Messrs. Mather and Platts', Salford Works, Manchester*).

IN writing a report on the Stationary Engines in the Vienna Exhibition of 1873, care must be taken to look on every subject with an impartial eye, because this is the first occasion our foreign brethren have made a show, in any exhibition, at all approaching us, and that, although we have had to scheme and invent in the first place, which they have only followed, it is clear that they have the perseverance to emulate us, and are determined to equal us in quality and design. The stationary engines form a very great feature in the colossal hall, specially set apart for motive machinery, which is nearly three-quarters of a mile long. Different nations of Europe compete with each other in the production of various classes of engines, and it is only surprising that our large manufacturers should have overlooked the fact of the necessity of sending specimens to an Exhibition in the midst of a people who are anxious to make themselves known in the engineering world. I conversed with several Englishmen in Vienna (one or two holding high official appointments), and the answer they gave me about the absence of English manufacture was not at all satisfactory. One said: "the expense" was too great, and the advantages ultimately gained did not compensate for the outlay. Another said that if we exhibited our goods it was only for them to copy. My answer to both was, that while we were neglecting the time and opportunity, our foreign brethren were showing to the world that they could manufacture articles as good as ours, if not so cheap at first, and that there were other places where they could supply their requirements without having to come to England. And again, with respect to the finish of exhibition work, it is well-known that most firms spend a good deal of time in getting up and finishing specimens of their manufacture for exhibition, to make them look as well as possible. When I remarked how well certain machines were finished, I was met with the reply, that it was quite unnecessary and useless, and that it was not intended to put so fine finish on such work for ordinary use. This clearly shows that they can do their work well, in some cases quite equal to, if not superior to ours.

It is not to be expected that ample justice can be done to all the different engines exhibited, on account of the shortness of my time in Vienna, and, in many cases, the opposition shown by the attendants at some of the stands, who were very jealous of anyone paying extra attention to their machine or engine, and noting any part down particularly. The officials were powerless to assist, as it was understood that exhibitors had not sent their things to be copied and have dimensions taken, but to show that their machines were superior to others in design and workmanship. If anyone were detected taking dimensions or sketching, he was liable to have the leaf torn out and taken before the commissioner, and to be ordered out of the Exhibition. In some instances the stands were left without attendants, so that notes could only be taken from a cursory glance ; and again, the difficulty in not being acquainted with the language was another drawback to the work, as interpreters were not in all cases easily obtained. The machinery began to run for the day about nine in the morning and stopped at five in the afternoon, and at that hour most of the stands were covered up to keep them clean, so that not much could be done afterwards. As I was not accustomed to the tremendous heat of the hall and weather combined, I was prevented from doing much in the middle of the day.

In looking for stationary engines to report on, I found all the nations of Eastern Europe represented with the exception of Turkey and Greece. The greatest number are from Germany and Austria, from the fact, I suppose, that these countries are nearest the Exhibition.

There are several engines of the old class without any improvement in design, *i.e.*, box section bedplate, double slide bars, crosshead, slide valve, and eccentric, &c. To this class one or two English exhibits belong. There are also several engines of the Corliss frame class with ordinary slide valves ; several of the steam hammer class with inverted cylinders ; several of the same class of Corliss valve as made by Hick, of Bolton ; and several on other systems of Corliss valves ; engines of the double beat valve class ; two winding engines with steam brakes ; one steam pump from Warsaw, and one large blowing engine. One firm, Danck and Co., of Prague, have a pavilion to themselves, with every variety of engines and pumps.

I had intended giving a detailed description or short specification of the various engines of merit, that anyone might easily understand the different classes of engines now made, and draw a comparison as to their merits, but the space allotted for my Report will not allow of my doing so. At the same time, it must not be supposed that those I refer to are all the engines exhibited, as there are scores of others, but those I refer to are taken from different countries to show the progress that has been made.

The Continental exhibitors have evidently looked forward to the Exhibition, and have attached great importance to it. I gather this from the fact that they have spared no expense, though some of the engines are of such large dimensions that one would have thought it unnecessary to lay out money in exhibiting them. One firm, the celebrated Schneider, of Creusot, has sent a 12-wheel locomotive, and, amongst other things, a compound condensing inverted-cylinder engine, elaborately got up, with all the polished work electro-plated. A New York firm exhibits a small inverted-cylinder engine, not more than 3 feet 6 inches high, and all the wrought-iron work in this is electro-plated. Danck and Co., of Prague, originally Danck and Co., Prague, Danck and Co., in Aussiz, and Breitfield and Evans, in Prague, now formed into a joint stock company, have exhibited in their Pavilion amongst other things a large horizontal rolling-mill engine of colossal proportions. It is 1,000 horse-power, and has been sold for nearly £8,000, English money. With regard to the engine in the Machinery Hall, it has nothing new. The valves are placed on top of cylinder, and the eccentric sheave is put on outside of bearing, close to neck and crank. The work is very strong and heavy, but does not call for any remarks. In the Pavilion there is a surprising number of machines exhibited. Blowing engines, rolling-mill engines, winding engines, and other machinery. The place is an exhibition of itself. They have a catalogue of their work, with a well-got-up plan of the whole Exhibition, which shows the position of their engine in the Machinery Hall, and the Pavilion in red, also a plan of the Pavilion, with all the machinery marked in its place.

The Société Cockerill, of Seraing, have erected a gigantic blowing engine, with the blast cylinder overhead supported on four diagonal pillars, with two fly-wheels ; and I was surprised to see it working. It was not quite steady, on account of the foundations not being as good as they should be, but it must have cost a considerable sum to set it to work at all. The design and workmanship are good.

Taking the engines altogether, I must say that the "Corliss" bears the palm; and although some of the valve gears look light with many parts, yet the eye becomes accustomed to them, and they are, no doubt, the engines we shall have to look to in the future. Most of them have the slides cylindrical, cast on the cylinder, cover and crank shaft pedestal. They are bored out at the same time the cylinder is turned, so that both are perfectly square with each other. The adjustment for wear is on the slide block and crosshead, and is effected by lock-nuts. Another feature in many cases is the polished cast-iron crank disc instead of wrought-iron crank. These look very well, and act also as small fly-wheels.

It is not necessary to say much upon the English Department. Messrs. Galloway's engine has nothing striking about it, except the governor, which acts upon the slide very quickly with the radius link. The Reading Iron Company have nothing new in their show, and I am much surprised that the system of working the governor by a strap has not been done away with, seeing that all makers are paying so much attention to the subject of expansion of steam, and that the governing part of the engine is of the utmost importance. Messrs. Tangye's engine is a very good one, the design and arrangement being new, but the bed looks rather heavy, though the work is very well done. The American engines are exceedingly good in design and workmanship, and the governors with the weight suspended on a flat spring do their work very well. That from the New York Company has a very well-shaped round frame which gives a novel appearance. Schneider, of Creusot, sends an engine which, for design and finish, is second to none exhibited; but I cannot see any great advantage in electro-plating all the bright work. It certainly gives it the appearance of silver, but it hides any defects. Bede and Parçot, of Verviers, show an engine of the Corliss class, which is excellent. The valve gear is not worked by an eccentric, but by a horizontal shaft worked from the fly shaft, and a vertical shaft with cams does its work very well. The great advantage of the upright shaft and cam is that the exhaust is entirely independent of the steam, and can be worked without any back pressure by setting the cam.

In the Swiss Department the Gebrüder Sulzers' engines are both excellent, of the Corliss frame class. The large one has vertical circular valves, worked by a shaft driven off the fly-shaft, and two small eccentrics keyed on it, which are attached to the valve levers. The small engine is well-arranged; the Corliss frame is strong and light, and the slide and expansion valves are regulated by the governor. Provision for working the air-pump, which is also well arranged, is very simple and good. This engine is of good design, and upon it engines from the smallest to any size may be made. Scheller and Birchtold's engine is not of a good design. The method of working the air-pump is not at all neat. The frame at cylinder end looks very unshapely. The circular vertical valves are worked very singularly by the cam rising and falling to catch each valve lever. The making use of the engine-bed for condenser and air-pump is the best feature. Esher, Wyss and Co., of Zurich, and Basil, of Zurich, show two Corliss engines, with valves and gear exactly the same as Hicks', of Bolton. They are excellent in design and workmanship.

Würtemberg.—Gebrüder, Dicker, and Co.'s engine is very good of its class in design and workmanship. The air-pump behind the steam cylinder does not look at all like what it is.

Schlessingen.—Sprottan's pair of engines are of good design, with circular valves worked by lever and eccentric. The valve boxes on the sides of the cylinder do not add to the appearance of the engine, as they look very clumsy.

Rendsburg.—Hollerschen Carlshütte's engines have nothing new, except the method of working crosshead, which has the bottom part in the shape of an inverted T, and moves between two plates, which act as adjustable top bars. Workmanship and design are only moderate. Sacshsische Maschinen fabrik in Chemnitz exhibit a large Corliss engine, which has only one fault, that the back piston-rod has not a crosshead and adjustable slide block, working on a slide bar. In other respects it is excellent, and without doubt one of the best in the Exhibition. Schellenbern, Chemnitz, do not exhibit any feature in their engine, the design and arrangement having nothing new.

Polluk, of Augsburg, shows an engine on the Corliss class, exactly the same as Hicks', of Bolton. Design and workmanship excellent. Maschinen fabrik, Augsburg, exhibit an engine on the Corliss class, with circular vertical valves on top, and exhaust in bottom. The air-pump is placed underneath front of cylinder, and is worked by eccentric on fly shaft. Design and workmanship excellent.

G. Sigl, Vienna and Berlin, has sent a pair of horizontal engines on the old principle, with the exception of the crosshead, with the bottom part in the shape of an inverted T. The expansion is also new, consisting of a rod which at one end is attached to the expansion lever by means of a pin with a square hole in. The pump is worked by a small double crank connected to crank pin, and fits in a pedestal.

Fried Wanneck, Brunn, shows a condensing engine of the Corliss class, with condenser underneath, worked by a connecting rod attached to a crank pin. Design and workmanship very good.

Joseph Oesterich, of Vienna, has an engine which is a strong one of its class, but it does not look well. The frame is too deep and massive, and too heavy by one-third at least. The arrangement of valve and expansion gear is good, as the latter is directly attached to governor, which will regulate the steam quickly.

Maschinen a Waggoner fabriks actien, Gesellschaft, Semmering, send an engine, the only peculiarity of which is that the cylinder end is bolted to a strong bedplate of the box section, which is very strong and gives a substantial appearance to it.

Blansko Furst Samsche, sends a horizontal winding engine of very good design and arrangement. All the handles for starting, reversing, and steam brake are close together, and the telegraph with two gongs attached is very good; so that, with ordinary precaution, no accident ought to occur. The winding drum is made of cast-iron; the boss, with recess for holding ordinary plate-iron, 6 in. × 1 in., which project out and are stayed together by struts, 6 in. × $\frac{3}{4}$ in. The rim of drum is made of wrought-iron plates, 9 in. × $\frac{3}{8}$ in., with angle-iron inside riveted to projecting plates, and wood pieces join the two rims together bolted to angle iron. The rope used for this drum is a flat one.

Lillpop, Rau, and Co., of Warsaw, show a pump, which is a well-arranged double-acting one, and the valves are very easy of access. Design and workmanship very good.

An engine, by Lessner, St. Petersburg, is an exceedingly good one. The foundation plate is very strong, and the valve and expansion gear well arranged. The workmanship is also very good.

Another firm, of Prague, formerly Ruston and Co., amongst other things, exhibit a winding engine with steam brake. The engine is a good strong one, and the arrangements for starting, reversing, and applying the steam brake, are very complete. The brake can either be worked by steam or hand, and the method of constructing the winding drum is very good. The boss on fly-shaft is cast iron, with recesses in for double angle-irons, which project, and at the ends are joined by other angles, which are riveted. The arrangement of steam brake is also good, and the effect very powerful. The telegraph is a very useful addition, as it shows the engineman the exact position of the rope, ascending or descending. They also exhibit an horizontal engine of the Corliss class, with horizontal air-pump underneath, worked by a cast-iron bell-crank lever off crank-pin. Workmanship and design very good.

Brunn, Maschinen fabriks. — Engine is a Corliss, and is excellent of its class. The valve gear is a modification of the general Corliss, and in some respects is very good. The peculiarity of this engine is the air-pump, which is placed underneath engine, and is horizontal, with a trunk ram and very short stroke, worked by a cast-iron arm, reciprocating by a connecting rod from crosshead pin. The workmanship is good, and the design new and well arranged.

I will now give a summary of what I saw, as a comparison of foreign work with our own.

After a careful examination I find that foreign castings, as a whole, are clean and well done. The brass work is very creditable, the rough castings, as specimens, being clean ; and particular care has been taken in finishing the work.

In the smithy department the work was, in some cases, neatly and artistically done, especially in the black work of locomotives, viz., brake gear, springs, coupling chains, and links, and other parts chiefly painted, which were good specimens of ordinary smith-work.

In the forge department are various kinds, such as connecting rods, uses, shafts, cranks, carriage wheels, finished and in pieces, tires, and the heavier portions of work, all of which show that they have extensive knowledge of the use of blocks for the work they have in hand.

The turning work, generally, is fairly done, especially in the heavier work, such as cranks, shafts, connecting rods, boring cylinders, and slide bars. Some of the work is on such a large scale, that it is evident that manufacturers have had the forethought to supply themselves with tools specially adapted for certain work. They must generally have had good tools from the quality of work done, but it is also evident that they can scarcely have had the advantages we have.

The fitting is carefully done, care being taken in setting out the work ; the parts which come together are well-jointed, and especial pains have been taken in finishing the parts, which work can only be done by the file.

The machine work is also very carefully done, and the shaping of radius parts, cranks, &c., and the heavy planing is also accurately finished.

It is generally admitted that foreign manufacture in this particular branch has made very rapid strides in the last few years ; having far surpassed us in the same time, and that we have not made that advance which our great experience and the talent of our workmen warranted us to expect we should.

After careful consideration of the qualification and abilities of foreign workman judged by their work, the conclusion I have come to is, that they are quite able to hold their own with us, and that their best skilled men are fit to be placed on the same footing as ours.

It cannot be denied that the days of monopoly by English manufacture are past, that we all stand on the same level, and that in the opening of new countries in future, the foreign manufacturers will compete with us for their share of work.

No doubt a great deal of our past success has been due, in the first instance, to the extraordinary cheapness of the raw material and fuel, but these for the last two years have completely turned round, having nearly doubled in price.

Another great drawback to us at the present time is the uneasiness existing between employers and employed, and which, if not satisfactorily adjusted, will lose this country numbers of our best men, whom we can ill-afford to spare. Both sides ought to reflect on the importance of this question, and endeavour in future to work together for the same object, which is to maintain the good name we hitherto have had, and which there is no just reason we should not keep.

I have not been able to get much information respecting the rate of wages paid on the Continent, but have obtained those of several countries from the men who were at the stands :—

England	Skilled men,	34s.	per week of	54	hours.	No Sunday work.
France	,,	5fr.	per day of	10	,,	,,
Belgium	,,	4fr. 50c.	,,	10	,,	,,
Switzerland . .	,,	6fr.	,,	10	,,	,,
Italy	,,	5fr.	,,	10	,,	,,
Sweden and Norway	,,	1rix-dol.(3s.)		11	,,	,,
First-class men, ½ dollar more. Food, &c., very cheap.						
Germany . . .	Skilled men,	1th. 20gr.	per day of	11	hrs.	Sunday work.
Schleswig . . .	,,	25gr.	,,	10	,,	No Sunday work.
Bohemia . . .	,,	2fl.	,,	11	,,	,,
Hungary . . .	,,	3fl.	,,	11	,,	,,
Russia	,,	1½s.r.	,,	11½	,,	,,

Machine Tools.

By JAMES HOGG, *Messrs. Gadd and Co., Manchester.*

AFTER a very careful inspection of the class of machinery on which I had to report, I found nothing of foreign manufacture particularly new in design nor in finish, of both of which there was every degree. Although I went with a full determination to be honest and impartial, I was forced to the conclusion that, for both, England was before all other countries exhibiting, and that all foreign tools were copies from English, some poor and others good. I did not hastily come to the above conclusion, for I took very favourably to various tools exhibited by Joh. Zimmerman, in Chemnitz, as being very well constructed and altogether a very good collection; but I learned afterwards that he had had English workmen making them. So that if this be true, though they are nearly equal to English tools, it is not to the discredit of English makers. His prices were nearly equal to those of some makers in England.

Another exhibitor, a Mr. Ducommun, had for show a good lot of small lathes, &c., very well got up, but I could not ascertain whether he had any English workmen or not. He was very willing to show the machines, and he seemed very proud to tell me that his prices were equal to Sir J. Whitworth's. Looking at facts like these, from whichever point we will, they point towards the fact that foreign makers in this branch of trade are competing with us.

I do not say that there is any danger of our being overtaken just yet; but then, it will be well not to rest too self-assured of our superiority. To say that they have not such good workmen, or that they cannot turn out such good work only means, in my humble opinion, that they are so much behind us, and does not mean that they are not in the race.

For a foreign maker to say that his prices are the same as Sir J. Whitworth's, implies that he is acquainted with those of Whitworth's, and probably with much of the work, which he evidently is, and takes advantage of, such as conical spindles and bushes; and of these and necessary parts being case-hardened, &c.

The foreign workman receives less wages, and works many more hours per week than the English workman. Now these facts count in favour of the foreign masters, but the foreign workmen have not that stability of character nor steady application to work that English workmen have, and therein lies the secret of our superiority.

As far as my observation and experience have gone, I have found that any average English workman—I speak now only for this branch of trade, although I doubt not it would apply to others—can do more work in a given time than an average foreign workman. But, as I have said, it will be well for us not to lose sight of the fact that they are certainly following us.

Commencing at the South-East end of the Machinery Hall, there is in the Russian Department a very good small slide lathe, six-inch centres, from St. Petersburg, very fair both in workmanship and design ; the only part that can be found fault with is the change wheels : they are too slender, and the pitch too fine ; they are cut-teeth, and appear to be well in gear, but too weak for the size of the lathe and to bear much work. But for the wheels I should consider it altogether a very good copy of an English lathe, such as is generally made for gentlemen amateurs. A good supply of chucks and face-plates, as bell-chuck, drill-chucks, &c., and a very good four-jaw chuck, well put together, with jaws case-hardened, and case-hardened spindle in driving head-stock, with conical necks, which were also case-hardened.

By the same maker, a wall drilling machine (that is, a machine fastened upright to the wall), worked by a treadle; workmanship only moderate, and very poor principle of design all throughout; bad position for driving pulleys, on a shaft supported by a bracket on left-hand side of spindle, and very close to the head of a workman when standing in front, as it is about the same height from the ground ; very poor in self-acting feed arrangement. When it is required to throw the worm shaft for self-acting out of gear, the bearings are loosened and are knocked along the slope in which they are, sufficiently for the purpose. For similar machines to the above, English makers have several very neat arrangements for self-action. There was also an 18-inch slide lathe with gap in the bed—very complicated in change wheels and reversing motion—in which there are too many wheels, and with five wheels to work the carriage along with the handle (whereas a wheel and pinion with the handle would do); hand-wheel, which is not required, for working back gear shaft longitudinally into gear with the wheel and pinion on spindle; conical bearings on spindle working in brass bushes; oil cups, that will hold about half a pint of oil on headstock, which are quite unnecessary, and so large they must often be in the way. The top slide of the rest overhangs the bottom one, some inches back and front, and the tool must necessarily spring very much when any pressure comes upon it. A lathe like this one ought to be able to take half-inch or five-eighths of an inch off a cut, but it would not do anything like that without springing very much. Now, if the two lathes reported on above—the one good and the other poor—are meant to be copies, it is proof that the faults of a machine are copied as well as the good principles; but if they be really their makers' own, it shows that they are in the field with us, and may in time become formidable competitors, by improving as necessity requires or experience teaches them.

Another exhibitor in this department, amongst other things, exhibits a good model of steam-hammer with uprights made of boiler plate.

F. Zimmerman, Hungary, exhibits a few tools, but nothing new, most of them well got up ; but on such parts as are straight from the planing machine, the tool marks are very coarse indeed ; also a very large face-plate with four jaws to slide in slots, meant for a four-jawed chuck, is without bushes for the screws to work against. The collar of the screw works against two projections, one on each side of the slot.

In the Austrian Department, *Ausser, Beurtheilung* has a good show of very fair ordinary tools, but nothing new amongst them.

Th. Schultz and L. Goebel, Vienna, exhibit a steam-hammer of ordinary make, very fair workmanship ; double-shearing machine, with vertical engine on same foundation-plate cylinder, driving upward to crank-shaft ; two fly-wheels ; gearing for driving-shaft on top of machine very fair, heavy, which shaft works the shear slides ; long 3-inch bolts from underside of foundation plate up sides of machine, two to each cap to take the strain when the shears are cutting. Altogether a very ugly and clumsy machine, the roughest casting in the Exhibition, very poor workmanship indeed. Cylinder cover on the engine chipped and filed round, and pieces knocked out at the joint about half an inch deep ; both shears set at an angle to the machine. They would not state the price ; said it was sold. This is not to be compared to De Bergues' machine, which was working at a short distance from it.

Johann Hipp, Vienna, had a good stock of foot lathes of various kinds, some with wood beds and some with iron ; some wood poppet heads, and some iron headstocks, very well fitted together, and made of hard wood, and nicely proportioned in their various parts, with the exception of one, about 15-inch centres, the headstocks of which looked slender and ill-proportioned; the ends and bottom 1 inch thick, with not even rounded corners, which would have strengthened it a bit. It might do for turning wood, discs, &c., which are light, but require a large diameter.

For Germany, *Joh. Zimmerman, in Chemnitz,* makes, as I have said, a good exhibition of tools, well finished in their various parts. Steam-hammer very good and neat. Large punching and shearing machine, to punch at one end and shear at the other, with, near the middle of the machine, a pair of shears for cutting angle iron, heavy body casting, well proportioned, and good gearing, only ordinary disengaging motion.

Good large-size planing machine, with a sort of press to hold the work, to take in about 10 feet long, but which did not appear suitable for anything of bulk; it had in it a long cast-iron *strip*, which might be done better in an ordinary planing machine. It might do for edging plates which would not go in an ordinary machine.

The steel-cutting tools were made of round steel ground off at an angle, and which are, in most shops, taking the place of the forged tools, which have to be bent up.

A very good wheel-cutting lathe for large sized wheels, bevel or others, was exhibited. A second small bed worked about beside the lathe in which the wheel is placed, to any angle to suit bevel wheels; this extra bed carries a rest with the planing tool, and is worked longitudinally by a screw in the bed, and driven with pulleys at the end with reversing motion, each tooth being moved round as required.

Collett and Engleharn, Offenbach-on-the-Maine, had a side-planing machine, and other large tools, similar to Zimmerman's, but not equal to them in finish.

Ateliers Ducommun, Elsass, had a good exhibit of small slide lathes, and a few other tools. This is the maker whose prices are equal to Whitworth's, and he has imitated Whitworth as nearly as he could in make, and also in case hardening the various parts of wrought-iron work, such as screws, nuts, screw keys, &c., with the tool marks left in. Lathe spindles are also case hardened. Almost all the flat surfaces, and some large surfaces, which we do in the shaping or planing machine, were done with a revolving cutter, while the work is moved about under it, as it may be held in a rest. The cutter leaves circular marks about three inches in diameter. They are scarcely so deep as the ordinary shaping machine tool marks; but I think the work is not likely to be so true, in consequence of there being more rubbing surface, and any inequalities in the work would soon find out the back lash, as it is called, or play in the spindle, and would give way at these places.

The Markise Maschinen Fabrick, Vorm, formerly Kamp and Co., exhibit a very large steam hammer: ordinary make, moderate finish, but only remarkable for its size, foundation, and uprights of boiler plate.

Bede and Co., Verviers, Belgium, exhibit a multiple drilling machine, for four drills, not very good workmanship: price, 5,000 francs, about £200. Boring lathe, moderately good: 7,000 francs, about £280. Ordinary hand lathe, about 7 inches centre, short bed, about equal to the above for workmanship: 1,800 francs, about £72.

Dandoy, Maillard, Lucy, and Co., Nord Maubeuge, France, have some small machinery of various kinds, but only very poor in finish, and nothing new about them.

Passing over the British into the American Department, there are a few very good small lathes and small planing machines of good finish, but nothing large in the tool line.

I cannot pass over, however, a case of workmen's tools without a word or two. They are very good indeed; I may say, I think, the best case in the Machine Hall; they are well got up, and are warranted true, and are all hard-straight edges, of various lengths, squares of different sizes, callipers, slide, and other gauges, &c., and there is an excellent case of twisted drills for various kinds of work, and of all sizes.

B. and S. Massey, Openshaw, show good small steam hammers, from about ½ cwt. to 3 or 4 cwt. For general smith-work, these are very useful sizes. *Thwaites and Carbutt, Bradford,* have steam hammers and tilt hammers of ordinary make and workmanship. The *Kirkstall Forge Company, Leeds,* show some large self-acting steam hammers, and *D. Davis, Newport,* exhibits patent self-acting steam strikers, to replace ordinary hand-striking. They seem very handy and useful tools for light smith-work. *D. New and Co., Nottingham,* exhibit planing machine; amongst a large stock of goods, a radial-arm drilling machine, shaping machine, and wheel lathe, but only of very ordinary make and workmanship. *H. Hind and Son, Nottingham,* have almost a similar stock, of about the same degree of finish on them, with a few good parallel vices and chucks. Without going into the description of each machine exhibited by *Sharp, Stewart, and Co., Manchester,* I may say, without doubt, they are the best tools of their kind in the Exhibition. There is something solid about their build, and they look as though they would work without straining. A slot drilling machine and planing machine displays very good workmanship ; but I need say nothing about that, for they would not be allowed to leave the works unless they were well finished. Very good double-head shaping machine, on the tables of which lies a locomotive connecting rod, to show the adaptability of the machine to work at both ends of the rod at the same time. The rod is finished at both ends in the hollows beautifully. Of course the ability of a good workman must count for something, but still there is credit due to the machine.

Lastly comes *De Bergue, Manchester,* with very well finished tools, the best exhibited for the purposes for which they are intended. The punching and shearing machines work so very steadily and with such ease that they cannot be surpassed, I think, by any of the foreign makers. The principle is very good, too, of throwing the weight of the head alternately on each side, so that it helps to do the work, through the head being fixed on a rocking shaft. The construction is very simple, and there are not many parts that can get out out of repair. A large punching and shearing machine for shearing angle iron, works very well, and makes as clean a cut as any machine I have ever come across. Their rivet-making machine is so well known that I may pass it over; but there is a small machine working next to it which ought to be mentioned; it is for finishing off the rivet head. In making rivets, though the bar iron is cut into certain lengths, it is not always equal in diameter; it therefore happens that there is more iron in the die than is required for the rivet; this surplus is forced out as a rim round the head. This machine cuts off this rim as follows. There is a horizontal rocking shaft, which has in it a die which can be changed at pleasure ; as this shaft is rocked out by a cam, the workman throws in a bolt; it rocks back, and a ram comes down ; the plunger is cup-shaped, and has behind it a spring, which allows it so much time to get the bolt in the centre of the die, as it has so much play, before the solid plunger is down to force the rivet through the die, which just cuts off the rim and leaves a clean round head. They also exhibit a small tool, which is very simple, to do away with the crowbar or lever, in raising the rails on the permanent way; it is called a leveller. To a plate that rests on the ground is hinged a short lever, which is raised or lowered by a screw sufficiently long for the purpose; the top of the screw is square, so that the handle with which it is worked may be taken off, to allow a train to pass over. They are cheap and simple, and a less number of men are required to do the repairs.

In conclusion, I may say that I left the British Department till the last, because, being most familiar with English tools, I had them in mind as a standard with which to compare the others that I examined, and by this means I was the better able to judge of their quality. I have only dwelt on those tools which I thought required special reference.

Locomotive Engines.

By JOHN FOX, *Lancashire and Yorkshire Railway Locomotive Works, Bury.*

THERE are forty-seven locomotives exhibited at Vienna. Of these, Germany contributes eighteen; Austria, fourteen; Belgium, five; France, three; England, Russia, and Italy, two each; and Hungary one. It seems a pity that in such a large collection of locomotives, America should be altogether unrepresented, and England and France so poorly. One of the French engines and both the English are only contractors' locomotives, so that England is hardly better represented than America. The reason Germany is so well represented is due in a great measure to its proximity to the Exhibition. As regards the construction of the engines, most of them differ from English practice, so far as regards detail, but not as regards their general construction; for instance, they have all either inside or outside cylinders, tubular boilers, and the inevitable blast pipe, though in the construction of one engine the cylinders have been placed on the sides of the foot-plate next to the fire-box. Most of the valve gears and all of the cylinders, with the exception of one pair, are placed outside the framing, which, of course, makes them appear more complicated than they really are. The motion work of one of the engines exhibited projects about 2 ft. 6 in. beyond the rails at both sides of the engine. The reasons assigned for adopting this plan are that the motion work is more easily got at, and secondly no crank axle is required; and if the cylinders are securely fixed to the framing, and at the same time placed horizontally, or nearly so, the engine will run with great steadiness, provided the wheels are properly balanced. Some of the engines are very large and heavy, and have as short a wheel base as it is possible to let them have (in order to facilitate their going round curves), which, of course, makes it worse for the permanent way. A great many of them have very large fire-boxes, partly on account of the inferior evaporative power of the fuel used, and partly on account of the increased power of engine required. These engines have been designed according to the work they have to do. In designing an engine, the main points to be considered are as follows :—What load will it be required to draw besides the weight of itself and tender ? at what speed ? What is the maximum rise of the inclines ? and what is the minimum radius of the curves of line over which it will have to draw the load ? and lastly, what is the evaporative power of the fuel intended to be used ? No doubt all these points will have had due weight in the designing of the locomotives exhibited, which will account for the large dimensions of some of them. For instance, on the Austrian railways, most of the coal used is of an inferior quality, and part of the country through which they pass is very mountainous, such as the Semmering Pass; and then again they take trains of forty and fifty carriages and waggons, and most of the third and fourth-class passengers are conveyed by the goods trains, which on an average run slower than our goods trains. As to the workmanship, all the German engines, with the exception of three, as well as three of the Belgian and one of the French, are quite equal to the very best engines we turn out, which at once shows us that we have met our match as far as regards the practical part of the business is concerned ; and we all know that the Belgian, German, and French workmen understand as a rule more about the theoretical part of their business than the majority of the English workmen do ; but then they have greater facilities for obtaining it ; for instance, the Société Anonyme de Marcinelle et Couillet, Belgium, which employs about 6,500 workmen, as well as M. Schneider, of Creusot, France, who employs upwards of 10,000 men, not only look after the comfort of their workmen and their families by providing them with comfortable and well-ventilated houses to live in, but they also provide a number of schools of different grades, from the lowest to the highest, without any restrictions as to either age or sex, and no fees to pay. In the advanced schools, instruction is given in all science subjects connected with mechanical engineering, so that if the men or youths have anything in them, it will be their own fault if they do not profit by the privileges that are granted to them. I think if English workmen were brought up under such favourable circumstances, they would be able to say of the theoretical part of their business what they can say of the practical part, that they may have their equals but not their superiors. Of course, in England we have our Colleges and Mechanics' Institutes, where instruction may be obtained on reasonable terms ; but there is not enough stimulus to encourage working men above a certain age to attend such places. There is no doubt that Sir Joseph Whitworth's scholarships have done a great deal to further technical education in this country; but as the stipulated age is rather low, all above that age have no inducement held out to them; and I think if Government offered similar advantages, only more in proportion to what is required in this large centre of engineering industry, and to *bonâ fide* working men only, it would raise the standard of technical education in England, and put us more on an equality with our Continental neighbours.

In making my Report, I examined each engine separately and carefully, taking down a description of the leading peculiarities. In the number of pages that I have to fill in the volume of Reports, it will be, of course, impossible for me to get in half my notes. In fact they make a good sized volume in themselves. I should have much liked to have published them all, but editors are autocrats.

RUSSIA.

This Exhibition is, I believe, the first at which Russia has put in an appearance, so far as locomotives are concerned. In one of these (the "Kaloma") the workmanship is first-class, and the wheels are the best in the Exhibition. If made by Russian workmen, they do them credit indeed. Both engines are a credit to Russian industry. Each engine has peculiarities of its own, rendered necessary by the conditions under which it works; such as double dampers, the second one being at the rear, to keep out the snow, and water cocks on the sides of the tender to enable the driver to see what his water supply is on long journeys.

HUNGARY

Exhibits a goods engine constructed by Herr Zimmerman, Pesth. Its outside cranks are made on a plan invented by Mr. Hall, an Englishman, the patent right of which has been sold by him to Herr G. Sigl, of Vienna, who is a large contributor of locomotives to this Exhibition, and who employs about 1,500 men at his works in Vienna. His cranks (which are almost elliptical in the body part, and about two inches thick) have very long bosses, which form the bearing surfaces for the axle boxes, which, of course, will be very large. The advantage gained by adopting this crank is that the motion work can be placed near the framing, which, on one of the engines exhibited, projects about 2 ft. 6 in. from the rails at each side, as I have said.

AUSTRIA

Exhibits the only inside cylinder engine in the Exhibition. It has been constructed at the works of the State Railway, of which Mr. J. Haswell is director. In 1852 the Austrian Government offered several prizes for engines, each one of which was to draw, besides its own weight and that of its tender, a gross load of 110 tons, at a speed of ten miles an hour, up the thirteen miles on the north side of the Semmering ; the greatest rise on this part of the line being one in forty for a distance of two and a half miles, and the average one in forty-seven. The least radius of the curves on this part of the line being nine and a half chains. Herr J. Maffei, of Hirschau, near Munich, won the first prize. In his engine he secured great adhesion to the rails by coupling the tender wheels by means of an endless chain, but it had soon to be abandoned; then Herr Engerth, engineer to the State Railway, to overcome the difficulty, constructed an engine on the following principle, though slightly modified. There are a great many of these engines at present running on the State Railway of Austria, and the following will give an idea of the principle of their construction :—The side frames of the tender are extended past the front of the fire-box, and are made to support part of its weight. A strong wrought-iron transverse stay is bolted to leading end of tender framing in front of fire-box. The centre of this stay is the point where the engine exerts its draught upon the tender, which can, therefore, move radially round this point to suit the curves of the line. The leading end of the engine is carried on two pairs of wheels, and the tender has three pairs of wheels ; the leading pair are under centre of fire-box. Each cylinder has two round guide bars placed above the centre line of cylinder ; and though they may not look as well as the ordinary rectangular bars, their prime cost is less ; besides, when they are worn they can be easily skimmed up in a lathe, and their blocks bushed ; and further, they will not require re-setting, as is the case with the ordinary class of guide bars. The steam-pipe is led down at right hand side of dome instead of through the smoke-box, which leaves more room in the latter place to get at the tubes when they require caulking.

There is a goods engine, constructed by Herr Sigl, at Vienna, which has superseded the Engerth engine on the Semmering incline. Its trailing springs are placed wider apart than the others, and are connected by a transverse compensating lever, the springs resting on its extreme ends, and the pillars from the axle boxes resting inside next to the springs ; this is to clear the fire-box. The dome is placed on leading end of boiler, and the regulator-spindle stuffing box is placed on the right-hand side of dome casing ; a long lever, which is curved in order to clear the boiler, is fitted on to the end of regulator spindle, and is coupled by a short rod to a long rod, which works through brackets (similar to handrail brackets), and extends to footplate, where a longitudinal thrust will work the regulator valve. This plan of working the regulator valve has been adopted by several exhibitors, some coupling the longitudinal rod to a curved lever, the fulcrum of which is on top of fire-box; and in one instance it is coupled to a bell-crank lever, with the fulcrum above the footplate, the thrust being vertical; in this position the driver will be able to work the regulator with great facility; and, lastly, in one or two engines it is coupled to a vertical lever, which works on the same fulcrum as the reversing lever. This engine is very heavy, being about fifty tons in working order.

The "Orient" is an outside-cylinder engine from the State Works. All the springs are connected with each other by compensating beams, and the trailing springs are connected by a transverse compensating beam. The boiler is worked at a pressure of 12 atmospheres effective, or 176·4 lbs. per square inch, which, at the present time, is considered rather high. This engine will only weigh about 20 tons in working order, and is intended for running round curves of small radius, on a 39.37-inch gauge, and will, no doubt, do a deal of work for its size.

The "Stainz" is a goods engine, and has been constructed at the State Works, on Haswell's system. Both eccentrics are forged together in one piece. The trailing wheels are made the drivers, which necessitates a long connecting rod, and also admits of a long eccentric rod, both of which are two very good points. This plan has been adopted in the construction of several of the exhibited engines.

The "Kaiser Franz Josef" is a goods engine. It is exhibited by the State Railway. It has been running since 1870, and was constructed at the same works as the last two engines, and is the 1,000th locomotive that has been turned out from those works, where they employ about 1,100 hands, and where they not only make locomotives for their own line, but also for other lines, just the same as a contract shop. Last year they turned out between 90 and 100 locomotives.

The "Austria" is a goods engine. It is the only engine in the Exhibition that carries its water in a saddle-back tank on the top of the boiler, with the exception of one of the small English engines. This engine is carried entirely on volute springs, three to each wheel. The chimney is cast-iron all through, as is the covering for the dome. The latter will be heavy, compared with the ordinary light sheet brass or copper ones. It is the only engine exhibited that has its coupling rod ends bushed; the bushes, instead of being keyed in as usual, have ears cast on their outside faces, and are secured by means of studs and nuts. The valve gear of this engine is of the stationary link type, placed inside, and reversed with screw gear. In this gear, the expansion link is suspended from its centre by two links, the other ends of which vibrate on a fixed centre. The eccentric rod ends couple to the ends of the expansion link, as in the ordinary shifting link motion. When the two centres of the two end holes of expansion link are vertical, the centre of the curve will be at the centre of that hole in valve link which couples to valve spindle socket. When it is required to reverse or shorten the traverse of the valves, the trailing ends of valve links, to which are coupled the expansion link blocks, are either raised or lowered as the case may be, and not the expansion links, which are only allowed to move in a longitudinal direction; that is, if we disregard the vertical motion given to them by the suspension links from which they are suspended; because, as long as these links vibrate on fixed centres, they are obliged to describe curves, and, of course, raise and lower the expansion links, and the shorter the suspension links, the greater the vertical motion. With this valve gear the lead of the valve will be constant at all degrees of expansive working.

The "Rittinger" is a passenger engine constructed for the Southern Railway of Austria, by the same maker as last engine. Its leading end is carried on a four-wheeled bogie. The eccentrics are wrought-iron and the ones next to the outside cranks are forged solid with them. The trailing cranks have large washers forged solid with them (their width being equal to the width of the two eccentrics which are placed between the driving cranks and the framing), the object being to keep the coupling rods parallel, which of course is necessary. The workmanship of this engine is very good, in fact it is the best finished of all Sigl's locomotives.

GERMANY.

The "Tauern" is a goods engine constructed by the Sachsische Maschinenfabrik in Chemnitz (formerly Richard Hartmann). The forked joints which couple the trailing ends of coupling rods to the driving ends are very long, being about 11 in. from centre of end holes to the root, and have besides the ordinary coupling pins each an additional pin, the holes for these pins being bored about 4 in. from root, the hole in the he or straight part of joint being made elliptical, the major axis of which is vertical in order to allow the requisite vertical play. The object in having such a long fork and two pins instead of one is to keep all the coupling rods in one straight line when the engine is going round a curve, its trailing axle being allowed lateral play, and the crank pins of this axle being made wider than the brasses in order to allow the arrangement just explained to accomplish the object for which it is designed. This plan is adopted on nearly all the eight coupled engines running on the Austrian Railways.

A goods engine constructed by F. Wöhlert, Berlin, for the Upper Silesian Railway. The water is carried in wing tanks, in the sides of which three pieces of glass are placed about 12 in. long by 2 in. wide, in order to tell the height of the water. The smoke-box door is kept shut by means of four sliding bolts placed at right angles to each other, each of which have two brackets to guide them; one handle placed in the centre will move all four at once. The buffer beams consist of two long T irons, which are riveted to a $\frac{3}{4}$-in. plate; they are fastened to the end of the framing by means of angle irons, and are further strengthened by means of gusset stays, which are rendered necessary because the centres of the buffer shells, which are wrought-iron and about 12 in. long, extend about 9 in. wide off the edge of the framing. The trailing draw-bar is rather novel, it is T-shaped at the inner end, which extends through buffer plate about $2\frac{1}{2}$ ft.; there are two holes in this cross-piece about 10 in. from centre to centre; there are also two other holes in the foot-plating about 12 in. from centre to centre, two links about 2 ft. long coupling the draw-bar to these holes in foot-plating, which are the points where the draw-bar transmits the pressure derived from the load of its train; the two latter holes are about 6 in. in front of buffer beam, the bearing surfaces of which are increased by having thick plates riveted to them, as is the usual plan with all draw-plates. The holes in the foot-plating are wider apart from centre to centre than the holes in the cross-piece of draw-bar, which therefore ensures a stable base for draw-bar; the effect of this arrangement will be just the same as if the draw-bar were made several times longer and were coupled correspondingly nearer leading end. This plan is a very good one, and well worth copying.

The "Vulcan" is an outside cylinder engine constructed by the Stettiner-Maschinenbau Actien Gesellschaft for the passenger traffic of the Bergisch Märkisch Railway. Its leading end is carried on a two-wheeled Bissell truck. The bearings, clack boxes, and name plates, there are four of the latter, namely, two at each side of the engine, are made of a new metal which is called Neusilber, and rather too free use has been made of it. This engine, which will weigh about 35 tons, will draw a gross load of 140 tons in addition to its own weight and that of its tender, at a speed of 30 miles an hour, up inclines of 1 in 72, and round curves of 984 ft. radius. The workmanship of it is very good.

The "Nord" is a tank engine, constructed by the Berliner Maschinenbau Actien Gesellschaft (formerly L. Schwartzkopff), Berlin. Its trailing axle is fitted with Adams' radial axle boxes, and has one large spring placed transversely. Its dome is furnished with a collecting pipe, which communicates with the top of the fire-box, a plan adopted by a great many exhibitors ; and the side cocks on fire-box casing are all connected with one pipe. The workmanship of this engine is very good.

A tank engine, constructed by Messrs. Krauss and Co., Munich, has its leading springs placed above the axle, and the trailing spring is placed transversely, so that the engine is only supported on three points. The water is carried under boiler, between the framing; in fact, the framing itself forms the two sides of the tank. This is a good point, because it lowers the centre of gravity. The coal is carried in wing bunkers. The valve gear is of the Allan or straight link type, and is placed outside, the expansion link being simply a solid bar. The regulator spindle stuffing-box is placed on the right-hand side of a small casing, which is attached to top of boiler. A longitudinal rod about $\frac{7}{8}$ in. diameter, which serves the purpose of handrail as well, couples to a lever which is fitted on to the end of regulator spindle, the other end of rod extending to footplate within the driver's reach. This engine, which will weigh about 24 tons in working order, is called a 150-horse power locomotive. The workmanship of this engine is very good, especially the motion work.

A passenger engine, constructed by A. Borsig, Berlin, for the Berlin, Potsdam, and Magdeburg Railway. It bears the number 3031, which represents the number constructed by A. Borsig when he finished this. The balance weights are forged solid with the wheels, and resemble a lune. The coupling rod brasses are tightened up by means of wedges and screws. Both the connecting and coupling rods are recessed, the cross section of which is a segment of a circle. The workmanship is really first-class; it is one of the best finished engines in the Exhibition.

A small tank engine, made by the Maschinenfabrik und Eisengiesserei, Darmstaat, for a 3 ft. 1⅜ in. gauge, has the buffer beam of wrought-iron, and flanged at both edges, which strengthens it considerably. This engine is badly fitted up, and does not do credit to its makers; and the same may be said of the adjoining engine by the same makers.

In the "Bismarck," all the wheels have a fancy brass plate, about 7 in. diameter, screwed on their centres with 4 small cup-headed screws. Brass liners are placed between the axle-boxes and horn blocks. The piston-rod glands are wrought-iron, and are bushed with brass, which is a good plan. The cylinders are clothed with sheet brass, the cylinder covers having a fancy beaded brass plate placed on their outside. The injectors couple right to feed pipes under footplate. The clack boxes look well. The fitting-up of this engine is first-class.

The "Linden" is a goods engine, constructed by the same firm as the "Bismarck." One inverted spring at each side of the engine, placed longitudinally, serves for both driving and trailing axles, the spring pillars being attached to the ends, and the springs to the centre of compensating beams. The balance weight for valve gear is about 2 ft. 2 in. long, by about 7 in. diameter, and is placed between two of the weigh-bar shaft arms, being secured by two large sett screws, which screw into it from the outside of the arms. When there is room, this plan of fixing it is very handy. The gauge-glass cock handles are coupled, and the socket end of a horizontal rod about 18 in. long, which works in brackets placed on the fire-box casing plate, fits on to the end of the bottom gauge cock plug, so that in case the gauge-glass gets broken, both gauge cocks can be shut at once at a distance of 18 in. from bottom cock, which is the length of the socket rod which is fitted on bottom plug. The jet cock is placed on the top of the leading end of boiler, and is opened and shut from footplate by means of the right-hand side handrail, which also is in communication with a small cock which is screwed into the flange of pipe which is attached to clack box. This cock is to show whether the injectors and pipes are all right. A rod which passes down the centre of left-hand side handrail is connected to a bell crank, which is placed on side of smoke-box, and works the cylinder cock motion. This handrail is also connected to a similar cock, which is attached to clack box at the right-hand side. It is a common practice with Continental builders to make the handrail serve for something else besides its own especial purpose. The workmanship of this engine is first-class.

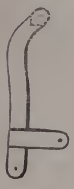
A goods engine, constructed by J. A. Maffei, Hirschaw, near Munich, for the Bavarian State Railway, is the 900th locomotive he has turned out, and is of the great width of 10 ft. Its cylinders are slightly inclined, and are fixed to the framing at each corner by two 1½-in. bolts. The guide bars extend beyond the transverse stays to which they are bolted, which is a good plan, because it will give more support to them than if they had been fixed as usual at their extreme ends. The workmanship of this engine is first-class.

The "Hessen" is a goods engine, constructed by Messrs. Henschel and Son, of Cassel, for the Bergisch Märkisch Railway. This engine has only four springs, and is, therefore, only supported on four points. The longitudinal distance between these points being only about 7 ft. 9 in., there will, therefore, be a great deal of overhanging weight at trailing end, a thing not to be desired when running quick, on account of the oscillating movement it will produce. The leading springs are connected by a transverse compensating beam, which vibrates on a pin which is fixed in two transverse stays, the beams going between these stays. One inverted spring placed at each side of the engine serves for both driving and trailing axles; it is placed underneath the framing, between the driving and trailing wheels, the framing being connected to the under side of spring buckles. The end holes of the springs are connected by means of long links to the compensating beams, which are made of two plates, placed above the framing; the beams extend both over the centre of both driving and trailing axles, and are made to bear on to the axle boxes by the intervention of short bars of iron, which work through guides fastened to framing. A bracket is fixed over the centre of each spring on the top of framing; it goes between the plates, which form the compensating beams, and is provided with a vertical slot, in which a block is allowed to slide, through the centre of block a pin is placed, which also passes through a hole in centre of compensating beam, the object of this being to allow the beam vertical, but no horizontal or side play. This plan is adopted in the construction of several other exhibited engines. The guide bars are very long; the reason is, no doubt, that if the transverse stays to which they are secured were placed nearer the cylinders, the wheels must either be placed inside the framing (in this engine they are placed outside the framing), made of a less diameter, or be placed nearer the cylinders; the latter plan would of course increase the wheel base, or, in other words, would decrease the facility for running round curves, and the first plan would necessitate the use of outside cranks ; and to reduce the size of the wheels would interfere with the work the engine is intended to do. The regulator spindle stuffing-box is placed rather high, with regard to foot plate, so high that if the ordinary upright lever were fitted directly on to the end of regulator spindle, the majority of the drivers would not be able to open and shut the regulator with facility without being elevated above the footplate, in order to have the lever a convenient height, and still retain the same amount of leverage, the following plan has been adopted, viz., a bracket in which a pin is fixed is placed on the casing plate of fire-box about 14 in. below stuffing-box ; on this pin an ordinary regulator lever works, on the boss of which is forged a horizontal arm, which is at right angles to centre line of lever, and in which a hole is bored about 3 in. from centre of boss, to which a connecting rod about 14 in., centre to centre, is coupled, and transmits the motion given to lever to a similar arm, which is fitted on regulator spindle, and thereby works regulator valve. Though not complicated, similar plans might have been adopted as has been done on other engines in the Exhibition, but at the same time the handle of the lever could not have been placed in the ordinary position as it is in this engine, and the leverage and direction of thrust remain the same ; if the lever was fitted with the handle placed below the spindle, it would be too low. The boiler is made on Becker's system, slightly modified, the crown plate casing being semicircular in this fire-box, and in Becker's system flat for about half its width.

The "Dniepr" is a passenger engine constructed by Herr Emil Kessler, Esslingen, Würtemberg, for the Carl-Ludwigs Bahn. The slide valves are Haswell's Patent ; their traverse can be shortened without wire-drawing the steam so much as in the ordinary valve. Both connecting and coupling rods are made of steel, and the cross section of the coupling rods next to their eyes is about 2½ in. by 1⅜ in. Their cotters are secured as follows : a piece of iron in which a slot is made is fitted into that part of the rod end-eye through which the cotter hole is cut ; when the cotter is put into its place a stud is screwed into it near its centre ; the piece of iron is then put in (the stud passing through the slot), and by means of a nut it is screwed to the side of cotter, which is then prevented from working out. This plan is largely adopted on the Continent. The boiler is fed by two of Schau's patent injectors ; they are made by

Schäffer and Büdenberg, and will supply 200 lbs. of water in a minute.

A tank engine is constructed by Messrs. Krauss and Co., Munich, for a 2 ft. 7 in. gauge. The ends of the expansion links are slotted, and the eccentric rod ends fit into the slots. The reversing gear of this engine is both novel and simple. There is a horizontal bar 1½ in. by ⅝ in. fixed on the right-hand side of fire-box, on which a slide block is fitted; the reversing rod (which is provided with a handle screwed into it at right angles) couples to this block, which can be held in any desired position by means of a spring and clip. Short spiral springs are placed between the nuts and washers of every cock-plug on Messrs. Krauss' engines, which of course will increase the durability of the plug and its bearing. This engine is called a 30-horse power locomotive, and will weigh about six tons in working order.



There is a tank engine made by the Maschinenbau-Gesellschaft Carlsruhe for a 31-in. gauge. The motion of the expansion link is communicated to the valve link by a link similar to sketch; it oscillates on a pin placed a little below the bottom guide-bar, the valve link coupling to the top hole, and the expansion link block works on a pin fixed in middle hole. I was informed that this link was a very good contrivance for the object already stated, and that it was worth making a note of; but the same kind of link was used twenty years ago in England; in fact I myself fitted up a valve gear with similar links three years since for an 18-in. cylinder engine, viz., the "Iron Duke," now running on the Lancashire and Yorkshire Railway. This engine has only three springs, viz., two leaders, which are placed above the axles, and one transverse trailer. The framing has a cast-iron box stay at leading end placed between the cylinders. The small cinders which are drawn through the tubes into the smoke-box by the draught may be discharged through a cast-iron pipe which is placed in the bottom of smoke-box; the orifice of this pipe can be opened and closed at pleasure. There is a great quantity of cast-iron used in the construction of this engine, the workmanship of which is very good.

BELGIUM.

A passenger engine is exhibited by the Société Anonyme de Marcinelle et Couillet for the Grand Central Railway of Belgium, the same firm having already turned out nineteen similar engines for the same railway, besides seven more which are in the course of construction at their works at Couillet. These engines, take daily, trains composed of twenty-one vehicles, at a speed of 37¼ miles per hour, over a road which has an incline of 1 in 200, and a train of nine vehicles at a speed of about 25 miles per hour, up an incline of 1 in 55: the mean consumption of fuel per mile having been 34¼ lbs. of the semi-bituminous coal obtained from the basin of Charleroi, which the makers say is a remarkable result when the road over which they have to run is taken into consideration. The cylinders are placed between the leading and central axles, and the guide bars are very long on account of the trailing wheels being made the drivers; but in order to secure rigidity two ⅝ plates are riveted to their sides, and when once set they have no occasion to be taken down to be straightened up, as they are provided with steel plates about ¾ in. thick, which are fixed to the inside of the guide bars by means of set screws. The valve gear is very complicated, the valves having expansion slides, and there are, therefore, two valve spindles to each cylinder. The gear that works the main slide is of the Walschaert type, and is always placed in full gear, being only used to reverse by the cut-off being regulated by the expansion gear. The latter gear is known as Guinotté's gear. When the auxiliary gear is set for any degree of expansive working, it is immaterial whether the main gear is placed either in fore or back gear, the cut-off will remain the same. The main gear is reversed by a lever, and can only be put in three positions, viz., fore, mid, and back gear, the expansion gear being regulated by a screw. There is no doubt that the object for adopting this gear is to reduce the consumption of fuel; but, then, to use an old phrase, it is robbing Peter to pay Paul, and it is a question whether Peter won't require more to keep him in working order, besides his increased prime cost, than it would take to meet Paul's original wants. I, myself, consider it no saving so long as the working parts of such an important piece of mechanism, which is subjected to such wear and tear as it is in the locomotive, are so greatly increased as in this valve gear; there is about as much work again as there is in ordinary gear. As for the workmanship, it is first-class.

The "Faurante" is a goods engine, constructed by the

Société John Cockerill, Seraing, for the Upper Italian Railway Company. I may mention, by the way, that these works, where about 9,000 men are employed, were founded by a Lancashire man, viz., the late John Cockerill, whose name they still retain; he was a native of Haslingden. In this engine the injectors are placed horizontally under the footplate. This position may be said to be the rule on the Continent, whereas in England they are generally placed vertically above the footplate. This engine is made more for work than show.

A six-wheeled coupled passenger engine has been designed and constructed by Charles L. Carels, Ghent. In the construction of this engine the cylinders are placed horizontally on the foot plate at the sides of fire-box between the trailing and central axles, their centre line being about 3 ft. 8 in. above the centre line of the wheels. Each cylinder is bolted down to a horizontal plate, this plate being fixed to the top of main framing by means of angle irons. The guide-bars are made out of about 3½-in. angle iron, the bottom bar being riveted and the top bar bolted to a vertical plate about ½-in. thick, the leading end of which is dog-legged and bolted to the side of piston rod stuffing-box, which has a flat surface to receive it, the bottom edge being secured to the same horizontal plate as cylinder. M. Belpaire, Inspector-General of the Belgian State Railway, first suggested the idea of putting the cylinder in this position, and claims for it the following advantages, viz., great steadiness when the engine is running at high speed, on account of the movement of the piston and its attachments being in an opposite direction to that of the coupling rods; the motion work being placed a greater distance from the rails, it will be more free from dirt, &c., and will therefore last longer; more of the moving parts will be directly under the driver's eye; and, lastly, not being obliged to oil except when required, a great saving of oil will be effected. That there is room for improvement in the locomotive engine there is not the slightest doubt, perfect though it may appear; and whether taking so much weight from leading end and placing it at trailing end, which of course is altering the proportion of the respective weights on trailing and leading axle in a twofold ratio (to gain the advantages previously described), will be a step in the right direction, remains to be proved, but I scarcely think it will. In this engine the leading wheels are put as near to the central wheels as possible, in order to increase the weight on leading wheels. The leading end of framing extends about 7½ ft. past the centre of leading axle. The wheels are about 5 ft. 7 in. diameter, and are placed inside the framing, the trailers being the drivers. All the springs are placed under the axles, and are connected by bell cranks and rods. The front spring links of leading springs are connected by bell cranks, as follows: the front spring links are connected with the horizontal arms of two vertical bell cranks which vibrate on pins fixed on the framing, and the vertical arms are each connected by a horizontal tie-rod to the longitudinal arm of a separate horizontal bell crank which vbirates on a pin attached to the bottom edge of each framing; the transverse arms of these bell cranks are connected by a transverse tie-rod. The trailing springs have a small pair of auxiliary springs placed above the axle. The motions of the pistons are communicated by means of two strong vertical vibrating beams to the driving crank pins, these beams being placed in bearings on each side of trailing end of footplate; the piston rod connecting rods being coupled to the top pins of the vibrating beams, and the driving crank pin connecting rods coupling to the bottom pins of vibrating beams. The valve gear, which at first sight appears complicated, when scrutinised, is very simple—in fact it is Walschaert's gear slightly modified: two long vibrating shafts about 2½ in. in diameter are placed in bearings under footplate, the shafts being about 9 in. from centre to centre; on each of these shafts are placed two short arms at each end, one of which is connected by a long link to a short arm which is placed on the axis of vibrating beam, which therefore gives the shaft a certain amount of vibration, the arm on the same shaft placed at the other end transmitting the motion to the expansion link, the centre of which vibrates on a fixed centre above the footplate; the expansion links have each an arm about 9 in. long projecting from their middle parts at right angles to the curved slots; to this part of expansion link, and not the bottom (as is the usual plan), the afore-mentioned links couple. The links, therefore, that communicate the motion to the expansion links move in a direction almost at right angles to the traverse of the valves, so that it will be seen that the right-hand side slide valve derives its motion from the left-hand side vibrating beam, and *vice versâ*. The motion given to the valve being, so far, similar to that which would be obtained from a single eccentric if placed on driving axle at right angles to crank, but, however, to give the requisite lead to the valve both in backward and forward gear, the contrivance introduced into Belgium by M. Walschaert is adopted, which is as follows: the ordinary valve link is not coupled direct to valve spindle, but to a vertical link which has three holes in it; the two top holes are very near each other, the valve link couples to the lower of these two holes, and the valve spindle to the top hole, while the bottom or third hole is connected with the vibrating beam at such a distance from its centre as will give the valve the extra motion required to allow for its lap and give it the requisite lead. Both the gauge-glass cocks and the usual auxiliary three-side cocks are screwed into a column which is fixed on back fire-box casing plate. The steam pipes are placed outside the boiler, but they are protected by casings. The exhaust steam pipes go along footplate and under boiler between the central and leading wheels. With these pipes having so many bends in them, and the distance from cylinders to the chimney being so great, the back pressure of the steam on the piston will be increased and the force of the blast will be decreased. The fire-box, which is made on Belpaire's system, is adapted for burning small slack, and is very long, being about 9 ft. The workmanship of this engine is only middling; in fact the valve gear is very badly fitted up.

A passenger engine, constructed by the Société Générale d'Exploitation de Chemins de Fer, Ateliers de Tubize, Belgium, for the Antwerp and Rotterdam Railway. Each driving and trailing spring is connected by means of a link and a pair of bell cranks. The pin on which the bell crank vibrates is attached to framing by means of a bracket, the spring links coupling to the vertical arms of the bell crank, the horizontal arms being connected to each other by means of a horizontal link, the cross section of which is about 1½ in. by 1 in. This arrangement has the following advantages over the ordinary compensating beam: it is a great deal lighter, more easily put together, is more suitable for wheels whose centres are far apart, and lastly, it costs less. Steel plates are interposed between the guide bars and blocks; they are secured to the guide bars by means of ¾-in. sett screws screwed in from the outside; they have rectangular grooves planed down their centre. The guide blocks are provided with similar rectangular fins, which fit into the grooves, and therefore guide the piston rods laterally. The connecting, coupling, and counter crank rods are all recessed, but only on the outside. There is no doubt that it improves their appearance, but, at the same time, it renders them less fit for the work they have to do, especially the coupling rods, which are so often subjected to extra strains of tension and compression when running round curves. Either groove them at both sides, or leave them alone altogether. The valve gear is of the type introduced into Belgium by Walschaert and by Herr Heusinger von Waldegg into Germany. This gear is reversed by combined screw and lever. The regulator lever has been made like an ordinary straight lever, and the handle afterwards bent at right angles, a plan which does not improve its appearance, though it may lessen its cost a trifle. The action of the valve gear is clearly shown by diagrams which are engraved on one of the side windows of the cab which protects footplate. I inquired of the Society's representative at Vienna (who kindly gave me engravings, &c., of this engine) whether the engine-drivers would understand these diagrams, and he answered me in the affirmative. The valve chest covers have been stamped; the smoke-box tube plate has been flanged, in order to obviate the use of angle iron in attaching smoke-box to it. The chimney is made out of one plate having been welded. There are specimens of all these three last-mentioned articles laid down by the side of the engine for inspection. The fire-box, which is of the Belpaire pattern, is about 7 ft. 3 in. long. The workmanship of this engine, especially of the motion, is really first-class. Attached to it is a four-wheeled tender, the brake tackle of which is very simple, and will work well. At the bottom of the leading hangers (which the brake blocks are screwed to) is a large boss, in the centre of which the ordinary transverse shaft works, on which two arms are placed at its right-hand end; the nut for brake screw is placed in the longest of these two arms, and a connecting rod couples the shorter arm to right-hand side trailing hanger, so that when the brake screw is screwed up, it pulls the long arm upwards, and therefore presses the brake block against the leading wheels, pushes the short arm in the direction of the trailing axle, and consequently forces the brake blocks against the trailing wheels.

A double bogie engine, constructed by the Compagnie Belge Matériel de Chemins de Fer (of which Charles Evrard is the Director), for the Grand Central Railway of Belgium, is constructed on Meyer's system, and is something similar to the "Avenir," which is now running on the Grand Luxembourg Railway. Each bogie has two cylinders, which are fixed to the inner ends of each bogie frame, and six wheels 4 ft. diameter, all of which are coupled and placed outside the framing. Each three pairs of wheels are very close together. The wheel base of each bogie is about 8 ft. 8 in., the total wheel base being about 28½ ft. The third pair of wheels from the cylinders are the drivers, and the connecting rods are very long, being about 8 ft. 4 in. Each driving and second pair of springs are connected by compensating beams. The axle-boxes are case-hardened, and the horn-blocks are provided with adjusting wedges. The bogie framings are well stayed, both by horizontal and vertical plates placed transversely. The cotters of coupling rods are secured by means of studs, &c., in a similar manner to the Dniepr. The connecting rods, coupling rods, piston rods, guide bars, and horn-blocks are all cast-steel. The valve gear is of the Walschaert type, and is placed outside, that on the leading bogie being reversed by the screw gear, that on the trailing bogie by a lever, but at the same time they can both be readily reversed together by means of the screw alone, by simply pushing a catch into gear. The boiler is supported by the leading bogie on one point only, viz., about 6 in. in advance of middle axle, the bearing surfaces being hemispherical in shape. The bearing surface of the supporting body, which is attached firmly to the bogie, is of cast-iron, while the bearing surface of the supported body, which is in its turn firmly fixed (by means of plates and angle irons made in the form of a box) to the boiler, is of phosphor bronze, a new metal which has already given good results. The fire-box is supported by the trailing bogie on two points, about the same distance behind central axle, as the other point is in advance. The bearing surfaces fixed to bogies are of cast-steel. The expansion plates, which have hemispherical bearings, are also cast-steel, and bear on phosphor bronze brackets.

Each pair of cylinders is provided with a separate regulator, one lever having a straight handle, the other, which is placed in front of first lever, having its handle placed at right angles to lever same as usual. The exhaust pipes, which blend into one, are placed under boiler, the steam going through the centre of the aforesaid cast-iron support and wrought-iron box into the blast pipe. The chimney, which is conical, is about 2 ft. 2 in. diameter at top, and 1 ft. 10 in. at the bottom, in order to increase the draught. There is a steam collecting pipe in boiler which goes from top of fire-box into dome casing. The engine is provided with the Le Chatelier counter-pressure steam brake. The steam pipes are led along the top of boiler for about 2 ft. 6 in. and then down the sides of boiler; between the two cylinders they are protected by a casing in order to prevent the pressure of the steam being lowered by radiation. The water is carried in wing tanks and the coal in wing bunkers which are attached to sides of boiler; they are very long, and extend the whole length of the engine, and about 2 ft. past the smoke-box. The cylinders are about $17\frac{1}{4}$ in. diameter, stroke being about $19\frac{3}{4}$ in. The boiler is about 5 ft. diameter and about $14\frac{1}{2}$ ft. long, and contains 289 tubes 2 in. diameter outside. The fire-box, which is made on Belpaire's system, is about $9\frac{1}{2}$ ft. long and 5 ft. wide outside the casing. The engine is about 42 ft. long over the buffers, and will weigh about 70 tons in working order. It is painted very nicely. The workmanship is first-class. I need scarcely add that this is the heaviest engine in the Exhibition.

FRANCE.

A goods engine, constructed by Messrs. Schneider and Co., Creusot, for the heavy inclines of the Compagnie des Chemins de Fer du Midi, has eight wheels; the third pair from leading end are the drivers. Both the leading and trailing axles are allowed lateral play, and the trailing ends of the coupling rods are provided with a double joint in order to avoid the strain which would necessarily be put on them when going round a sharp curve if vertical play only were allowed for. This engine is very heavy, namely, about 54 tons in working order, and has all its motion work (which is made of steel, but which contains very little carbon) electro-plated, clothing belts as well; and although it may make it look very pretty, I think it is quite out of place. The workmanship of the whole engine is really first-class.

A goods engine, constructed by Messrs. Claparede and Co., St. Denis, near Paris. The boiler and fire-box was clothed with sheet brass, which of course, though it increases the cost, does not improve its look; the valve gear of this engine is of the stationary link type, and the workmanship is nothing extra.

ITALY.

The "Napoli" is a goods engine constructed by the *Società Nazionále d'Indústria Meccánico, Naples.* The guide blocks which guide the piston rod crossheads are placed on the piston rod end of crossheads, flat surfaces being provided to receive them. The way the coupling rods are coupled together is rather peculiar. The he, or straight part of joint, is similar to an ordinary rod end eye, and has a cotta hole cut through it. The coupling pin is held firm in this part of the joint by means of a taper cotter which is provided with a screw, and forces this pin by means of the intervention of a piece of metal, similar to an ordinary bearing, right up against the root of the hole. The she, or forked part of joint, is bored out the same diameter as pin, as is usual, and has therefore the requisite amount of vertical liberty. I myself see no advantage in adopting this plan, because both holes or bearing surfaces must be of the same diameter, or else they cannot be coupled up, and when the pins are renewed the he part of joint will have to be lapped out to the same size as forked part; and as for the extra firmness, it will be a disadvantage when the engine is going round a sharp curve.

Both the clack boxes and both the injectors are placed on the left-hand side of the engine, the clack boxes being placed together near middle of boiler, and the injectors, which are placed vertically, near together on footplate. The workmanship of this engine is very poor, in fact it looks like an old engine rigged up again.

The "Ariosta" is an express engine, and though it has been made by a German firm, viz., Messrs. Andre Koechlin and Co., Mulhouse, it is exhibited in a short tunnel belonging to the Italians. Its valve gear is of the stationary link type, and the workmanship is good. The tunnel referred to is a full-sized model of the entrance to the Mont Cenis tunnel.

I have now referred to all the engines of any note with the exception of the two small tank engines from England, one of which carries its water in a saddle-back tank, and the connecting and coupling rod brasses of the other are made to cover the outside of the crank pins, and therefore keep a great deal of dust off the bearings; its leading axle is fitted with Adams' radial axle boxes, and the engine is provided with the Le Chatetier patent counter-pressure steam brake.

There are many exhibits connected with locomotives that I cannot notice. Herr Becker exhibits, in a pavilion on the northern side of the Machine Hall, a fire-box and its casing, made on his system, together with the casing of the boiler belonging it, but separated from it. It is something similar to Belpaire's system, the difference being that in the latter's plan the crown casing plate is made flat all over with corners only slightly rounded, the use of transverse stays being therefore necessitated for the top parts of the side casing plates; besides all the top parts of crown casing plate being flat, it will require staying all over, which is done with vertical stays, which are screwed in from the outside and extend through the top of copper fire-box, nuts being screwed on the stays tight up against the two plates. This arrangement, as well as Becker's, is in order to do away with the heavy girder roofing stays which are used in England.

In Becker's plan the fire-box crown casing plate is only made flat to a limited extent, and is in the present case about 26 in., the remaining part at each side being curved same as usual. The crown plate of copper-box is bent to a radius of about 14 in. at each corner. There are four rows of wrought-iron stays, twelve stays to each row; the distance from centre to centre of stay in the longitudinal direction of fire-box being about 7 in., the two middle rows are about 1¼ in. diameter, the two outside 1⅛ in.

diameter; they are all turned less in the middle, in order to increase their elasticity; copper washers $\frac{1}{8}$ in. thick are interposed between the nuts and the two plates. The crown plate of copper-box is 1 in. thick, the sides being $\frac{7}{8}$ in. thick. The boiler, which is about 4 ft. 2 in. diameter and 13 ft. 6 in. long, is double riveted and made out of two single plates, these plates being jump-jointed. The plate which goes round the barrel over the transverse joint is $\frac{3}{4}$ in. thick by 8 in. wide, and has four rows of rivets in it.

In the construction of a great many of the fire-boxes belonging to the engines exhibited the copper stays have a small hole of about $\frac{3}{16}$in. drilled down their centre. And of course when a stay cracks the water will work its way through and speak for itself. The fire-box clothing plates have holes drilled in them opposite each stay, about $\frac{7}{8}$ in. diameter. I noticed when going through the Austrian State Locomotive Works that most of their stays were wrought-iron, the ends only being slightly riveted over, and not made to lie close to the plate as is done in England, the latter plan not being required. They have a very powerful hydraulic press at these works, by means of which they make a great deal of the iron and steel work by pressure, which in this country is made at the forge and finished by the smith and his strikers. They make their axle boxes out of wrought-iron by means of this press, which, when finished, have the corners quite as good as any casting. In welding up the bosses of the wheels they are placed between cast iron dies and pressed. This plan of forging is largely adopted on the Continent.

CONCLUSION.

In conclusion I will say that this grand display of Continental locomotive engineering shows us that we have got formidable rivals, so far as regards the construction of the locomotive, who seem to be trying, on every hand, what they can do to improve it, whereas in England, those in authority generally say that what is has done before, and will do again (of course there are exceptions). There is no doubt that if our patent fees were more in proportion to those on the Continent, we should be more stimulated to improvement than we are at the present time. Then, again, there is no doubt that the great advance made on the Continent of late years is due, in a great measure, to Englishmen who have gone there, on account of the greater remuneration they can get for their services; and when following their avocation in the capacity of workmen, the native workmen, of course, have watched their modes of working, and thereby gradually got to be their equals, or nearly so, just the same as an apprentice does, or should do, during his apprenticeship. Then there are Englishmen, generally practical men, who hold the honourable position of managers, and who of course (which is to their interest) give the men the necessary information required. For instance, in Vienna the superintendent of the Sudbahm Locomotive Works, who is assisted by his son, is an English gentleman, namely, Mr. John Hardy, of Newcastle; as also is the manager of the Austrian State Railway Locomotive Works, Mr. J. Haswell, who likewise is assisted by his son.

The last words of my Report, and as my deliberate conviction as a workman after seeing the Vienna display, are these, I will simply say, that if we do not mind what we are doing, both employers and employés, we shall have the tables turned, and instead of supplying foreigners with locomotives we shall have them supplying us.

Engineers' Machine Tools.

By CLAUDE CARTER, *Bridgewater Iron Works, Salford.*

BEFORE commencing my Report, I may mention that I had much difficulty in getting information for it. I had the greatest difficulty with the Germans and Austrians, who, in most cases, absolutely refused any information whatever, or admission within the barriers ; and one exhibitor actually covered a machine up three separate times : so that a very close observation was in most cases a thing impossible. Sketching (which would have been a great advantage) was not permitted ; and, while taking notes, my book was constantly being examined, either by the constables or the persons in charge of the stands, who had orders to destroy all sketches.

Russia

Exhibits a slide screw-cutting and surfacing gap lathe, about 1 ft. 6 in. centres, by Mr. G. A. Lessner, St. Petersburg ; but the whole finish of this tool was very inferior, and the design *not* good.

Hungary

Exhibits a railway wheel lathe, about 4 ft. 3 in. plates ; headstocks fitted with cast-iron spindles working in cast-iron bearings ; no tail-pins, but spindles kept up by lock nuts at back end. Fast headstock fitted with cone pulley carried by brackets cast on front. On one end of the pulley shaft is a pinion running loose, and working direct into spur ring on face plate. This pinion is driven by a sliding claw-clutch. On the other end of same shaft is a sliding pinion which works into a wheel about 3 ft. 6 in. diameter, which is keyed on bottom pinion shaft. By this arrangement of gearing a good variation of sped is obtained, as it can either be driven double or single-geared, and the two plates can be driven at a different or the same speed at the same time.

The slide rests are the ordinary English design ; the tool keeps are cast-iron, swivelling on centre bolts, and having two set screws for holding tool ; self-acting feeds by ratchets actuated by means of a crank-disc driven by gearing off spindle and working in a snug on front of head, one feed per revolution. The carriages are short, and do not stretch across the bed. The bed sides are of the inverted gutter form, and are without connecting bars, excepting one at each end, and are planed on top, with a round nose tool, and about eight feeds per inch. The face plates are fitted with two drivers and four dogs each. The dogs are a very poor job, being only about 2½-in. cubes; they have no sliding surface, and will not be steady. The design and finish of this tool are very good, with the exception of the jaw-chucks. The fitting-up and painting are first-class, and all unnecessary bright work is avoided.

Austria

Exhibits a portable ratchet slott-drilling machine. This little tool is designed to cut key-ways in shafts (which are fixed) without removing the same; it is cramped to the shaft. The cramp part is cast to a slide running parallel with the shaft, along which slides the head, which is traversed by a screw. The traverse is effected by means of a worm on the spindle working into a worm-nut on screw, the screw being stationary and the nut revolving. The spindle is worked by means of a lever and ratchet. The vertical feed is put on by a hand-wheel at top of spindle. When cutting a slott, the down-feed is put on; the drill is then worked until the full length of slott required is traversed. The head is then run back, fed afresh, and worked up again; and this process is repeated until the required depth is cut. The drill exhibited with this machine was of the Rhymer type, having cutting edges both on the periphery and on the bottom. The slotts cut in the shaft exhibited were exceedingly good. The machine is very small and portable, and a very fair job.

Messrs. Escher, Wyss, and Co., Leesdorf, exhibited duplex railway wheel-lathe, 4 ft. 6 in. plates, fitted with cone pulley (5 speeds, top one 24 in. diameter, bottom one 9 in. diameter, and 7 in. wide) carried out at back of fast headstock. But the whole lathe is a very rough job, badly finished, and the design is neither good nor proportionate.

A trace lathe, by Mr. Ausser, Beurtheilung. Plate about 4 ft. 6 in., filled with self-acting, transverse, and angular feed motions. The headstock is about a strong 14-in. one, cone pulley has 5 speeds, spindle runs in brass bearings, has no tail pin, but is kept up by lock nuts. The pinion which runs in the face plate ring is carried on one end of a third shaft, and is driven from the outer end of the back shaft by a wheel and pinion which work outside the headstock. It is fitted with a short bed or base plate, the face of which is about 2 ft. 6 in. below the centre of spindle; on this bed slides a cross bed or carriage, and on this carriage the slide rest slides at right angles to the centre of spindle. The feed shaft is placed along the front side of the bed, and is driven from the tail end of spindle by cone pulleys. This shaft gives motion to the surfacing slide by means of a pair of bevel wheels and screw. To this screw is geared a shaft which runs parallel to it, and gives motion to a vertical shaft (by means of bevel wheels) working through the centre of standard and slide rest. A third pair of bevels are here introduced which work the swivel screw for the self-acting angular motion. The longitudinal feed is by a screw running along the centre of bed, which is geared up to the cone pulley shaft. By this method all the three feed motions are worked by one pair of cone pulleys. With this lathe is a four-jaw chuck, the dogs of which slide on short slides. These slides are bolted on the face plate, and are adjustable for large or small diameters. This is a *first-class* tool, well designed and proportioned, *very* well finished, and all useless bright work is entirely omitted.

There is also a face lathe, plate 8 ft. The headstock about 2 ft. 9 in. to the centre, bolted on cast-iron stand or foundation block, the spindle works in brass bearings, 10 in. diameter at large end, and tapers down toward tail end. The gearing is a light 24-in. lathe, double gearing, and is carried by brackets cast to the side of headstock arms. The pinion, working in the face plate ring, is keyed on the end of cone pulley shaft, so that the plate can either be driven single or treble geared. There are two slide rests sliding on one cross bed or carriage, which is adjustable on the base plate either to or from the base plate. The self-acting feeds are by ratchet motions. With this lathe is a four-jaw chuck, similar in construction to the one with the foregoing lathe. This is a *very* good tool, and well finished in every respect.

There is a large double drilling machine designed for the man to mind both spindles. Having fixed his work on the large table, he sets the drill to work self-acting, and then works the small spindle until the large one wants attending to again. This machine is not at all proportionate. It is extremely heavy and massive in the frame and table, and light in the gearing. The frame is strong enough for a machine to bore holes 16 in. diameter, whereas the gearing will not do more than 6 in. properly. The workmanship is good.

Treble-geared slide, screw-cutting and surfacing gap lathe, 4 ft. 6 in. face plate. The fast headstock is about 16 in. centres and treble-geared, and has spur ring cast on face-plate. The gap can be widened by taking out a step piece which makes it about 3 ft. wide, the slip piece being 1 ft. 6 in. The carriage, rest, and poppet headstock are all of the ordinary type; the guide screw is outside the bed, and about 3 in. diameter.

The general design of this lathe is not good; the step piece in gap is not firm, and the whole lathe not rigid enough to turn articles 4 ft. 6 in. diameter. General finish and workmanship good.

Horizontal pedestal boring machine for boring pedestals, small fixings, &c., is exhibited, consisting of a bed (similar to a lathe bed) about 10 ft. long, carried on two standards. On this bed are two upright fixings, the one at the left hand carrying the horizontal spindle, and the other two the boring-bar. Between the boring-bar fixings is the table which slides on the bed by means of a screw, and has a self-acting motion. The table has also a cross slide for adjusting the work to be operated upon. The spindle is driven by gearing and cone pulley carried by a headstock fixed to the left-hand standard and the floor. This gearing drives a vertical shaft by bevel wheels, which vertical shaft drives the spindle by another pair of bevels. The table is not adjustable vertically, but both the boring-bar and spindle are by screws. This is a very useful, strong, and well-finished machine, but I think much more complicated than when the spindle and bar are fixed vertically, and the table adjustable.

Germany.

Messrs. Wagner and Co., Dortmund, exhibit a horizontal rail slott drilling machine, to drill 3 holes at one operation. This machine consists of a box bed, having fixed at one end the tables, at the other the driving gear, at the left-hand side (from the table) the crank disc, at the right hand the feed-motion gearing, and on the top the carriage and spindles. The gearing is a 16-teeth 1¼ in. pinion, working into a 50-teeth wheel; the pinion is fast to a plain pulley about 16 in. diameter and 3 in. wide. The spindles are horizontal, working in square brass steps which are adjustable in pitch; the centre spindle is driven by the 50-teeth wheel. On this spindle are two pinions, one at each end; each pinion drives an intermediate wheel, one at either side. These wheels run loose on short shafts, which are carried by links, two each from the centre spindle, and two from each side spindle; two at each side of wheels. These intermediate wheels work into pinions keyed on the two side spindles. By this arrangement, the pitch of spindles can be altered without interfering with the gearing, the links always keeping the wheels properly in gear.

In order to make the holes' slotts, the 3 spindles are all on one carriage, which slides across the bed. This motion is given by means of a horizontal crank disc and connecting rod. The crank disc is worked by a horizontal shaft, worm and wheel, and a pair of bevels. The worm shaft is driven by a pulley cast to the driving pinion. On the other end of this shaft is the worm running into the worm wheel, which wheel is keyed on the bottom end of a short vertical shaft. On the top end of this shaft is keyed a bevel pinion working into a bevel wheel fast to the underside of the crank disc.

The self-acting feed motion is by a bevel pinion working into the crank disc bevel, and the shaft running through the machine is geared up to another shaft running back again ; but what the internal arrangement for working the carriage screw is I could not get to know. I should think an eccentric working a ratchet wheel nut the most likely.

The table is adjustable horizontally, but *not* vertically. The vertical adjustment is accomplished by the top slide, which is made to suit the section of rail to be drilled, so that it is requisite to have as many top slides as sections of rails to be drilled.

The machine complete occupies about 5 ft. × 5 ft. × 4 ft. high, and is a very compact, strong, and well-finished job.

A number of lathes and screwing machines are exhibited by J. G. Schone and Son, which are not well finished, neither are they new in design.

T. X. Honer, Ravensburg, exhibits a double-head double-geared drilling machine. The drill-head is double and equal sided, and stands on a turned column about 12 in. diameter, on which slides and swivels one table. The other table fits in a bell-shaped stand which stands on the base plate. This table is circular, and is elevated by means of its pivot, which is screwed, the stand being chased to receive it, in order to lock it any height ; the stand is split where chased, and is tightened on the pivot by means of bolts fitting in snugs cast at either side of splits. On this table is bolted a parallel vice. The finish is rough, and the machine has a very top-heavy appearance.

A planing or shaping machine, for shaping the teeth of bevel and spur wheels, is also exhibited by this firm. The wheels are cast with very thick teeth, which are planed to shape and pitched at the same time. I could not get any particulars of this machine (which is very complicated), as the man in charge would not allow me inside his stand, and I could not see much from the outside.

Messrs. Englerth and Eunzer-Eschweiler exhibit a 5-in. double-ended angle-iron and bar-shearing machine, with knives at an angle. The knife-backs are bolted to frames, and adjustable by sett-screws through jogle-pieces : this is so as to change the bar-knives for angle-iron knives. The slides are worked from an eccentric shaft by means of wrought-iron links, fitted with brass steps double gearing, driven by an engine about 10-in. cylinder and 14-in. stroke, which is fixed to the side of the frame. This machine is a *dreadfully rough* job ; the knives are black from the forge, all the bolt-ends roughly cut and standing through the nuts in some cases 1½ in. ; it is also very badly designed : no notice whatever appears to have been taken as to where the strength was requisite, just over the jaws being the lightest part about it. The castings also are very badly done—it is, in fact, the roughest tool I ever saw.

Mr. J. Zimmerman, Chemnitz, shows an *A*-size slott-drilling machine, which is an almost exact copy of Sharp, Stewart, and Co's., Manchester, the only alterations being the use of an eccentric on the spindle for the self-acting boring feed, and in place of the head being adjustable longitudinally, the table is fitted with compound slides. The tool exhibited in this machine was a flat steel cutter, fitted in an open-ended cutter bar, and projecting beyond the end of the bar, about one-eighth of an inch.

By the same exhibitor is a double-ended eccentric punching and shearing machine for 1¼-in. holes in 1¼-in. plates—a very heavy double-geared machine. The frame is made of two box castings, and is jointed down the centre vertically. Between the punching ram and the opening for the large wheel is an opening and an apparatus for shearing angle-iron, worked from the same eccentric shaft. The wheel on the eccentric shaft is about 4 ft. 6 in. diameter, 3 in. pitch, and 6 in. wide. Both the punching and shearing rams are fitted with stop-motions, which is accomplished by moving the compression links away from their bottom bearings in a side direction. This is a very good and well-finished machine, but the stop motions, I think, are objectionable, because when the rams are being worked, the links are always at an angle, therefore the pressure is never vertical ; also the bearings for these are little more than a flat surface.

M. Zimmerman exhibits a railway-wheel lathe, face plates 4 ft. 6 in. diameter. The gearing of this lathe is similar to an ordinary double-geared lathe, with cone-pulley on the spindle and a back shaft; on the outside end of the back shaft is keyed a pinion, which works into a wheel keyed on the bottom pinion shaft. This latter gearing can be thrown out, and the lathe worked as an ordinary geared lathe, or the two face plates can be driven at the same or a different speed at the same time. This lathe is elaborately finished, the rests, carriage, and bed, all being scraped and polished, which is quite useless, and, though costly, does not at all add to the value of the machine. It is a good and well proportioned tool.

A wheel-moulding machine, exhibited by the same firm, is an exact copy of Mr. G. L. Scott's patent machine, one of which is exhibited.

An eight-feet face and break lathe, also by Zimmerman, is fitted with double gearing, carried by arms cast on the side of the headstock, with small pinion working into the face plate spur-ring; this pinion can either be driven single speed or by the double gearing. The bed is very wide, and carries a large carriage, with self-acting surface motion, by which the whole face-plate can be faced at one operation, though when at the full diameter the cut will not be very steady, as the carriage overhangs a long distance; the rest is an ordinary one, though very strong. The rack for moving the carriage is placed in the opening in the bed with the teeth upwards; this plan is decidedly objectionable, because the spaces will be constantly filled with the cuttings. The height of the poppet-head centre is about 24 in., the base of which is brought out of the centre towards the front of the lathe, and is about 2 ft. 6 in. wide. The spindle is 4 in. diameter, screwed at the back end, and works through the hand-wheel. This is a very good well-finished tool, the only objectionable features being the overhanging carriage and the racks.

A shaping machine, about 10-in. stroke, fitted with moveable head on 8-ft. bed. The mandril for circular work is fitted in an independent fixing, which is bolted to the table saddle when in use and can be taken off when not required. One advantage claimed for this arrangement is, that it can be put to any existing machine without any alterations or preparations of same. A good, strong, useful and well-finished machine.

There is a planing machine, for planing the edges of boiler and bridge-plates, consisting of a long table projecting about 2 ft. out at the back of machine, and standing 2 ft. 1 in.

from the floor. On each end of this table are strong screws, about 5 in. diameter, on which slide a cross-bar or beam; through this beam are eight sett screws, by means of which the plates are cramped down to the table. Along the front, and of the same length as the table, is a bed similar to an ordinary 12-in. lathe bed, and having a screw running along the centre; this screw is driven by gearing at the left-hand end of machine, which gearing is similar to that of an ordinary rack-planing machine. The pulleys, three in number (two fast and one loose), are about 20 in. diameter and 4 in. wide; the gearing is single, with a second motion-shaft and two pinions, introduced to get the reversing motion. The screw works a carriage backwards and forwards along the bed; this carriage carries two uprights back to back; each upright, which stands about 12 in. above the face of table, carries a down slide, on which is fitted a clapper or tool-holder; the uprights also slide towards the table, to adjust the cut. The vertical self-acting feed-motion is by ratchets and levers, the levers striking catches which are fixed on the front of beam by bolts in a T slott, and are adjustable to suit the different lengths of plates to be planed. The horizontal transverse slide-motion is not self-acting. The strap-forks are actuated by a sliding bar, which slides in two guides at front of the bed; on this bar are two adjustable stop-collars, and on the carriage a third guide, which strikes the stop-collars and so forces the bar along, at the same time moving the strap-forks; this bar is kept in position by a balance-weight. This machine is designed to cut both backwards and forwards—one tool one way and the other the other way—a number of plates, of course, being planed together. This is a good, strong, and well-finished machine, the only objectionable feature being the narrowness of the table and the extra length the carriage has to travel in order to bring the second tool to the end of the plate, which is about 2 ft. 9 in.

On a stand facing Zimmerman's is a plate-planing machine very similar to the foregoing one, the difference being in the table, which has three projections cast to it, about 4 ft. square, one at each end and one in the middle; this enables broad plates to be fixed without overhanging. The reversing motion is by open and cross bolts, and the carriage is fitted with one tool-holder only, which is circular and revolves in its bearing, thereby enabling the cut to be taken either way but not both ways. A fair job, but not so well finished as J. Zimmerman's.

There is also a railway-wheel lathe, diameter of face plates 4 ft. The two plates run loose on large bosses cast to the headstocks or standards. They are put together in halves and fastened with bolts. The bearings are hollow, carrying in their centres brass V blocks and caps, in which the axle-journals run. At the back of the headstocks, and with their spindles projecting towards the V blocks, are small poppet headstocks; these are used to keep the axle right endways, and also to centre them so as to adjust the V blocks. In this lathe no dependence is placed on the bearings of the face plates, which merely act as drivers. The V blocks, in my opinion, are much too light for the work. In other respects this is a very fair piece of workmanship.

An internal curvilinear slotting machine, adapted for slotting the curved sides of cranks or any large internal curves, is by Londeman and Slee, Chemnitz. The main frame of this machine resembles in form that of an ordinary slotting machine, and is fitted with the ordinary compound slide and rotary tables. In place of the ram (as in a vertical slotter) this machine is fitted with a semi-revolving spindle driven by a worm wheel which is keyed on between the two bearings, and the worm shaft runs lengthways, and in front of the frame and at the back end carries a set of pulleys (large and small) for open and cross bolts; in the top side of worm wheel is cut a T slott which carries two stops, these stops as the wheel revolves strike a lever in connection with the strap forks similar to a planing machine reversing motion, the large and small pulleys producing a quick return motion. The vertical feed is by ratchet, the spindle being similar to a drill spindle with screw feed. A large, strong, and well-finished machine, but too costly for the work it will do.

A small slott-drilling machine, by Constantine Plaff, Chemnitz, is a copy of Sharp and Furnival's, with this exception, that the table is carried by a centre bracket, which prevents any long article from being slotted across; this is a decided fault. A good average job as regards workmanship.

BELGIUM.

A 4-spindle multiple drilling machine, by Ste. Houget and Jerton Bede and Co., Verviers, consists of a base plate, on which stand two uprights; across the uprights and cast with them is a slide carrying four heads, and sliding up the front of them is the table; the four heads are adjustable in pitch by means of one screw running along the bottom of slide and working in a nut in each head; these nuts are round brass bushes, with a collar at each end, and they revolve in their bearings, or are fixed as required; when fixed and the screw turned, the carriage is of course traversed, and when loose, stationary; by this method all four carriages or any of them can be moved by means of one screw only. The spindles work in long solid bearings the full depth of the head, and are driven by a shaft running along front of slide (in a recess) which is geared to the spindles by screw wheels; the ends of spindles are split in four, chased taper, and a nut run on which closes the four parts equally and grips the tool. The self-acting feed motion is by worm wheels on the spindle screws, which are worked by four worms sliding on a continuous shaft; this shaft is driven from the screw-wheel shaft either by a pair of cone pulleys, or for a quicker motion by a wheel running into a pinion. The pinion and driven cone each run loose on the worm shaft, and between the two is a friction clutch (sliding on a key), which can be thrown into either pinion or pulley, or rest between them. The table is adjustable vertically by two independent screws, one at each end. This is the most faulty part of the machine, as the table will require to be set parallel with the slide every time it is elevated or lowered, which is a troublesome and unnecessary job, providing the machine was properly constructed. The countershaft works in bearings at the back and bottom of uprights.

SWITZERLAND

Exhibits a patent slott-drilling machine. This machine is very similar in form to the foregoing multiple drill, but in this case the uprights, baseplate, and slide are all cast together; the double gearing is carried by brackets at the left-hand end of the slide, and works the spindle by means of a sliding shaft and a pair of bevels. The sliding motion for the head is accomplished by a crank disc and wrought-iron connecting rod; the crank disc is let into the slide (its face being flush with the face of the slide), and is keyed on a short shaft running through the slide; at the other end of this shaft is keyed a worm wheel, which is worked by a worm and shaft driven by a cone pulley on the end of the gearing shaft; two self-acting feed motions, one for ordinary boring and the other for slott drilling. The table slides up the front of uprights, and is fitted with compound slides. The head is adjustable in stroke, but not in position. A very good strong tool, well finished, and without any useless work in it.

FRANCE.

The tool makers of France exhibit a small number of light flimsy tools, comprising lathes, screwing machines, and small drilling machines, all of which are unworthy of notice.

GREAT BRITAIN.

Messrs. Hind and Son and Messrs. D. New and Co., Nottingham, exhibit a number of tools, consisting of wheel lathes, slide and screw cutting lathes, slotting machines, &c., all of which are inferior in workmanship. They are not wanting in strength, and not bad in design; but, in my opinion, these two makers are surpassed by all their foreign competitors.

Messrs. Sharp, Stewart, and Co., Manchester, exhibit a patent radial slotting machine; a railway wheel and tire drilling machine, for drilling from the inside wheels and tires on their axles; and other machines; but as full particulars can be obtained in England of them, it is not necessary to give them here, especially as my space is limited.

Mr. G. L. Scott, Manchester, exhibits his patent wheel-moulding machine, capable of moulding wheels from 12 in. to 7 ft. diameter. This machine is now so well known and in such general use, that it is unnecessary to describe it in detail. In my opinion no foundry ought to be without one.

AMERICA.

Messrs. Wm. Sellers and Co., Philadelphia, exhibit a patent planing machine, to admit about 3 ft. 6 in. between the uprights. In the uprights, bed, table, and tool boxes there is nothing new; the novelty consists in the driving motion and the arrangement of the strap forks.

The pulleys are three in number, the centre one being fast and double the width of the two outside loose ones. On the pulley shaft, which runs across the bed, is keyed a bevel pinion, working into a large bevel wheel; this wheel is keyed on the end of a worm shaft, running through the bed at an angle of about 30 deg. to the centre of it. In the centre of this shaft is a worm, which works into a rack on the underside of the table; the teeth of this rack are at right angles to the centre line of bed, and the angularity of the worm shaft is such as to make the teeth of the rack and worm parallel. I believe, in stating that the teeth of the rack are at right angles to the centre line of the bed, I am hardly correct, as they are at a slight angle about 1 deg.; this causes the drag to be a little to one side, but the friction of the worm in the rack being the reverse way, is *supposed* to counterbalance this.

The reversing motion is by open and cross belts, and the arrangement of the strap forks, and the motion for working them, is very ingenious and complicated; its action is such as to always throw the one belt off the fast pulley before the other has commenced to drive at all, also the forks are always locked when the machine is either standing or working. This machine is very well finished, and of good proportions, but I do not see any improvement in the method of working it, either over the rack or screw system; on the other hand, I think it is decidedly objectionable in having two belts, and also a very awkward machine to fit up and bore, especially when the bed is very wide and long, as it will necessitate the use of a very long boring bar. The bevel wheel also, in a large machine, will, I think, become a very large and clumsy thing.

A 9-inch slotting machine, by the same firm, is a very good single-geared machine, fitted with loose slide for ram, which can be lowered, so as to support the ram when taking heavy cuts near the table. The whole machine is rather light, but has very good and long bearings. All the tools by these makers are remarkable for the quality of the tool-work on the lathe; the bed, carriage, and slides are planed with a "broad cut," and are not touched by hand. The planing is, indeed, a splendid job, and is the finest I ever saw.

Conclusion.

In drawing my conclusions, I may say that I was very much disappointed with the exhibits from my own country; there are but five exhibitors, and the quality of their work you will be able to judge from my remarks. It appeared strange to me that not one of our Leeds tool-makers were represented.

Germany and Austria contributed very largely indeed, and much of their work shows great skill, and is certainly done by first-class workmen, but at what cost I am unable to say.

I was sorry to see so many of the tools with so much bright and useless work about them, which, though it makes them much more costly, does not at all add to their real value. Had the time and labour spent in polishing and getting up such things as wheel-lathe beds, &c., been spent on larger wearing surfaces, more suitable materials, and in many cases better designed curves and more graceful forms, it would have been greatly in their favour, and have added much to their appearance. This does not apply to Messrs. Sharp, Stewart, and Co., Messrs. Sellers, and Co., of America, and a few other makers, as their tools were made for use and *not* show, and presented to my eyes a much more pleasing sight.

One thing struck me very forcibly, and that was the entire absence of novelty in design. Almost every tool exhibited, no matter by what nation, is an almost exact copy of English manufacture, and if altered at all it is for mere alteration's sake, and not for any improvement ; in fact, the whole of the tools exhibited are of English origin.

I had expected to see a larger assortment of tools for the manufacture of railway plant, such as axle-turning lathes, wheel presses, spoke-bending machines, tyre-rolling mills, &c., but with the exception of wheel lathes, and one or two drills, they were not exhibited at all, although they now form a very important class of tools.

The castings and materials, I found, with but very few exceptions, exceedingly good, the bright and faced work exhibiting no blows or defects of any kind. Special care has, no doubt, been taken in the production of all the things exhibited, but it is a proof of what the foreigners are able to do.

My opinion, after a careful survey, is that the Germans, Austrians, and Americans, are quite as competent to manufacture machine tools as ourselves, though from all I saw they are either very dull at designing, or else (which is, perhaps, the most probable) they find it more profitable to make use of designs already matured and worked successfully in this country.

Comparing the *whole* of the English exhibits with those of Germany and Austria, we are entirely put in the shade; I am glad to say though that this country was very badly represented, and must not be judged by her exhibits at Vienna, or else in place of standing A 1, she will sink below Germany, Austria, and America.

Silk-Weaving Machinery.

By JOHN RANDLE, *Mr. Oswald Pike's, Manchester.*

ON commencing my work in the Exhibition, I was very sorry to find that France, Switzerland, and England, the principal silk-weaving countries, had not one machine exhibited. This crippled my resources to a great extent, and renders my report, which would otherwise have been interesting, meagre and of no value.

There was only one ribbon loom in the Exhibition, and that was in the Austrian Department. It is on the Swiss principle, and is what we, in this country, would call a plain loom. The loom was at work, and was making a ribbon with plain middle and round edge, which is one of the easiest patterns to make. It contains two sides, with the usual fixtures, breast piece, knee roller, back roller, warp cratch, back rack, jack ladder, healds, back reeds, front reeds, weights, and lathe. When the warps are put into the cratch and ready for the loom to be put to work, the end of the warp is put on over a pulley in the back rack, then round a pulley with a weight hanging to it, over another pulley in the back rack, then brought down in front, drawn through the back reed, and put round the back roller through the healds and front reeds; and, when the usual cards are fixed, the loom is ready to start, and makes the ribbon. The working of the shuttles I liked very much indeed. In the bottom of the shuttle is cut what is called a rack. The shuttles are sent backwards and forwards by a slide in the bottom of the lathe, which works from the end. This slide turns the little cogs that send the shuttles backwards and forwards across the silk. They work admirably and easily.

The construction of the warp in the English looms is, I think, much better than that in the Austrian. There is no back rack to the English. The warps are put into the cratch, and the warp bobbins have a groove at the end. A cord is wrapped once round one end, is fastened to the front of the cratch, and a wire hook is put under a little wood lever, and then another weight hooked on at the end. The lever has nicks in, so that one can weigh the warps to any pressure one likes. The warps work straight down from the bobbins, and there is no more trouble with the weights. A man minds the loom with twenty or twenty-four shuttles long, and a young woman picks up the warps. The Austrian loom weights hang all about the back, and the man has to pick up his own warps at the front of the loom, and can only mind one with eight or ten shuttles. From this it is evident that the English weaver can do a far greater amount of work in a day than the Austrian, and can also do it much better, because he has nothing to do but mind his work and keep out the faults, whereas the other cannot but let faults be made in his work while picking his warps up. The case of ribbons which I saw is not worth commenting upon. The pattern was very plain; it was plain middle with satin and round edge. The same can be said of the Jacquard ribbons, which had only old common figures down the middle.

The hours of labour and rate of wages I did not ascertain, as the person minding the loom was not to be found after the first day of my being in the Exhibition. During the week there were four looms brought from Switzerland: one for broad ribbons, two for narrow, and one broad for elastic weaving. Before I came away I had the pleasure of seeing one of them working without any silk in, to get it smooth, and it was exactly the same as the one I have described above. I ascertained the hours of labour and wages from one of the men putting the looms up, which are eleven hours per day; wages on the ribbons from twenty to twenty-four shillings per week, and on the elastic thirty shillings, but I am doubtful as to the truthfulness of this statement. I also made inquiries of a Berlin cloth-weaver, and learned that the cloth weavers in Berlin work eleven hours per day, and earn fifteen shillings per week; to this my informant added that the work-people are not satisfied, and are agitating for higher wages. As to the hat-trimming weavers I was told that at Elberfeld and neighbourhood they get more money and work less hours than the cloth-weavers at Berlin. Knowing that the English masters have a great deal to contend with in German goods being brought into the English markets so cheap, I determined not to come home without learning more about this class of weaving, and I accordingly broke my journey at Elberfeld on the road home, and was there informed by one of the largest firms, that in summer time their weavers work from five o'clock in the morning until seven and eight o'clock at night. When I say how they work it will be believed the hours of labour are correct. I then went to a place in the country called Ronsdorf, and all through the village on both sides there is nothing but hat-trimming weaving. It is all done by hand in the weavers' own dwellings, and, having no masters, the hours of labour are of course regulated by themselves. In each house I could see one, two, and three looms, but most of the houses had two. The men, women, and children work the looms. I went into three or four of what they called warehouses, but they are the least pretentious of that name I have ever seen. The first one looked to me as if it had been a coach-house ; the entrance was a large door-way, and it looked more like a hen-roost than anything else. The second floor was the warehouse—it had the appearance of an English hay-loft. The weavers fetch their work out in blue bags. I went into one or two of the houses, but could not ascertain the wages. I found nothing in the looms worth reporting upon. They are Swiss make, the same as I have mentioned before. They have an iron rod which comes up at each end in front of the loom from the lathe arms, and is then fastened to a pole across the front of the loom. By pushing the pole down the loom is turned.

In the silk dress weaving the only improvement I found was in the English department. In weaving a dress it takes as many colours as the dress is to consist of, and consequently a shuttle for each colour. In former times, when weavers had woven enough of one colour they had to stop the loom to change the shuttle for the next colour. The first improvement was a shuttle box to hold three or four, and as the different colour was wanted the box would rise and fall, but it appeared very clumsy. The last improvement I saw at the Vienna Exhibition was a good and neat one. The box that contains the shuttles is a round one worked by a little Jacquard at the end of the loom, and as the cards go round, it turns the shuttle box and picks out the colour wanted. The working of this improvement is very nice.

Before closing my report I have one more machine to mention, and perhaps all will understand it better if I call it a machine for winding sewing cotton on bobbins. It fills many bobbins at once. The large bobbins with cotton on are placed at the back of the machine, brought over a rod in the centre, and put through an eye which is fixed to a guider that moves backwards and forwards to guide the cotton level. The bobbins are put on a spindle close to the guider, and under the spindle is a little trough. On the opposite side to the spindle is another trough, and while the machine is going the man puts an empty bobbin in. When the bobbins are full the man takes hold of the lever, the machine stops, the spindle draws back the full bobbin and drops it in the trough, and then comes forward ; the trough on the opposite side places the empty bobbin on the spindle, then goes back to its place, and off goes the machine again without the man either touching bobbin or cotton. It is a splendid machine, and was made in Manchester.

PART II.

REPORTS BY ARTISANS

FROM

BIRMINGHAM,

WITH

INTRODUCTORY REPORT,

By W. C. AITKEN.

INTRODUCTORY REPORT.

By W. C. AITKEN,

THE REPRESENTATIVE OF THE BIRMINGHAM CHAMBER OF COMMERCE, WHO ACCOMPANIED THE BIRMINGHAM ARTISAN REPORTERS.

THE following Reports are the result of a desire expressed by the Committee of the Birmingham Chamber of Commerce, on the 19th of June last, requesting me to accompany a number of artisan reporters, to be selected from those of the town, to visit and report on various classes of manufactures, similar to those produced in Birmingham, exhibited in the Austrian Universal Exhibition open in Vienna, and to undertake the discharge of duties of a like kind to that I was honoured with on the occasion of the International Exhibition held in Paris in the year 1867.

On the last-named occasion the Chamber took advantage of the assistance afforded by the Society of Arts in London; then, however, the sum of £500 was placed at the disposal of the Society by Her Majesty's Government, in order to aid the sending of artisans: the sum named, aided by private subscriptions, in the end amounted to £1,040. Partial monetary assistance was only required then; on that occasion the Chamber contributed liberally, which was acknowledged in the Official Reports of the Exhibition of 1867. In Mr. Coles' Report he states—"*A total sum of £1,040 was obtained, of which £137 was subscribed by Birmingham, which appears to have been owing to the community taking collectively the greatest interest in the proceedings.*"

The parsimonious policy adopted by Her Majesty's Government in reference to the Vienna Exhibition rendered any assistance in aid of sending artisans to Vienna as reporters an impossibility. It became evident ere the Universal Exhibition at Vienna opened its portals to visitors, if valuable lessons were to be read therein, and artisan reporters were to be sent, they could only be through such means as those the Chamber adopted and carried out in connection with the Society for the Promotion of Scientific Industry at Manchester.

Mr. Larkins undertook for the Society he represented to convey the reporters selected by the Birmingham Chamber of Commerce to Vienna and back, with lodging and board *en route*, at a sum not exceeding £10 each; the reports of the Birmingham artisans to be published by the Manchester Society, after being examined and edited by myself; the selected Birmingham reporters to accompany those sent by the Society for the Promotion of Scientific Industry.

It was also agreed the number of Birmingham reporters should be increased. A Sub-Committee of the Chamber, consisting of C. S. Hawkes, Esq., chairman of the Chamber, Mr. S. Booth, chairman of the Sub-Committee, and Messrs. J. S. Wright, W. H. M. Blews, Alfred Field, Edmund Tonks, and John Bragg, requesting me to take the necessary steps for procuring applications from candidates anxious to undertake the duty of reporters. Advertisements were inserted in the various local newspapers. Eighty-eight applications were received.

I determined to apply the strictest test as to the knowledge possessed by the candidates in the trade to be reported upon, and the following circular was sent to each applicant.

> Visit of Birmingham Artisans to the Vienna Exhibition.
>
> Your application has been received. You will observe that *experience and ability determine selection.* A *report* has to be *written.* As a proof of your descriptive power, express in as *few words* and as *clearly* as you can (on foolscap paper, written on one side only), the description of
>
> [*Here was inserted description of construction, or rationale of process used in trade, &c., of the applicant.*]
>
> The description is to be made from practical experience and observation. No book description is to be copied. Your description will be tested by reference to an experienced authority in your trade. Your name will not be disclosed.

The circular produced descriptive papers from candidates in all amounting to 40; many of the papers were very elaborate, carefully and well written, the majority accompanied by drawings, where such were requested.

The appeal made by the Birmingham Chamber to manufacturers and others realised the sum of £196 14s.

The amount of the subscription was considerably more than on the occasion of the Paris visit in 1867; then the cost of sending reporters amounted only to £4 10s. 4d. each, on the occasion of the visit to Vienna the cost was £14: i.e., to Vienna and back, £10; Birmingham to London and back, £1; for Report, £3; necessitating the reduction of the intended number of the reporters to ten, finally selected as follows for:—

Sadlery and Harness	Frederick Thompson.
Gold, Silver, and Electro-plate	Frank G. Jackson.
Design of Works in Metal, &c., more particularly Jewellery	J. W. Tonks.
Jewellery Manufacture	Arthur McKewan.
Brassfoundery, General and Cabinet	George Cashmore.
Tinplate Working and Japanned Ware	Henry Bishop.
Glass, Ornamental, and for Table Service, &c.	Thomas C. Barnes.
Guns (General Report)	Charles Hibbs.
Railway Carriage Building	Frederick C. Cowney.
Ironmongery, &c., &c.	George Wakemen.

Three were added, their expenses defrayed by their employers.

Labour Saving Machines	Henry Fowler.
Bell Casting, &c.	John Banister.
Gas Fittings	Edwin Parker.

Two also, who entirely defrayed their own expenses, and kindly handed me reports on—

Tubes and Rolled Metals	Mr. James Grice.
Buttons, and Small Wares . . .	Mr. S. Wall Richards.

The number of reports is fifteen.

To assist the reporters what to observe the following general instructions and recommendations were given :—

To observe the extent to which Exhibits of the Special Industry each representative is sent to report upon are displayed in the several Industries of the countries exhibiting. How far such differ from similar works made in England. Objects of a kind in the special Industry of the reporter not made in this country, but which may be, to compete with those produced by the manufacturers of other countries.

The reporter to confine his attention to the special branch of Industry he has been selected to report upon ; *to form the first and primary object of his visit:* thereafter to visit Manufactories in his specialty or trade, if time permit; the results of such visits, if accomplished, to be embodied in his report.

Reports to be written on ruled foolscap paper, leaving one inch margin on left-hand side ; *to be written on one side of sheet only.*

General, special, and minute directions were also given for reporting on

Saddlery, Harness, Whips, and Works in Leather, as Portmanteaus and Travelling Appliances.—Electro-plate and Gold, Silver, Plated Wares. —Jewellery and Gilt Toys, including Chains.—Gas Fittings, Chandeliers, and Lamps. Plumbers', Cabinet, and General Brass Foundery, Bells and Tubes.—Tin-plate working, Coppersmithing, and Japanning. —Glass used for Glazing, Table and Fancy Glass.—Buttons, Metal Caps, Ornaments, and Tools. — Guns and Small Arms. — Labour Saving Machines.—On General Ironmongery.—Railway Carriage and Wagon Building.

Also to observe where opportunities offered as to

Influences affecting the character of the work, and trade generally, as :—
Cost of material, wages, conditions and divisions of labour, Education, habits of life, amusements, &c.

The Birmingham artisan reporters left Birmingham on the 2nd July, and met those of Manchester at the Bishopsgate Station, London : recognition and fraternization was promoted by each wearing in his button-hole a piece of crimson ribbon. The party were conveyed by rail to Harwich, by steamer to Antwerp, by railway to Aix-la-Chapelle, *en route* by way of Dusseldorf, Elberfeld, Leipzig, Dresden, Bodenbach, Brunn, and Prague, to Vienna : reached, including stoppages for purposes of sleep, refreshment, &c., on the morning of the fifth day.

VIENNA.

Arrived at Vienna, kindly welcomed by the chief of the British Commission, Philip Cunliffe Owen, Esq.; by him introduced to Baron Schwarz Senborn, Director General of the Vienna Exhibition; received by him graciously, invited to partake of his hospitality; presented with a plan of, and escorted by him through the marvellous and overwhelming Exhibition, which he had planned and executed for the encouragement and improvement of the industries of Austria, and those of other countries. It can be affirmed no body of British artisans ever were honoured with or received recognition more graceful and kind than that received at the hands of Baron Schwarz Senborn, conferred by him on the English artisan reporters sent by the Chamber, associated with those of the Society for the Promotion of Scientific Industry, in all thirty-four in number.

THE WORK OF THE ARTISAN REPORTERS.

Provided with tickets of admission by the British Commission, and catalogues—(no general catalogue could be procured). But the catalogue of the British division contained plans of the Exhibition building, showing the position of the united exhibits of each country—and, with such aid to guide them, the reporters proceeded to examine the class of exhibits each was required to report upon. The Exhibition building in London in 1851 covered 800,000 square feet; in 1862, 971,288 feet; at Paris, 1867, 1,581,725 feet. At Vienna, the Exhibition building, machinery, and east and west agricultural halls, covered 2,501,200 feet. Add the fine arts building, 1,970,000 feet, and allow 500,000 for forty other buildings, and the aggregate exhibiting space of the Vienna Exhibition was certainly not less than 5,000,000 feet, or $3\frac{1}{6}$ larger than the Paris Exhibition of 1867. The vastness of the Vienna Exhibition may thus be realised, and the difficulties arising from merely physical, apart from mental labour, undergone by your reporters, be better understood. The thermometer indicated 95° in the shade!

DRAWING.

By general instructions given to the reporters, they were to make memoranda sketches of parts of objects, or such as would supply hints to aid their special industries: this was partially defeated by officials. The value of the sketches made by the reporters, and destroyed through the instrumentality of the officials named, cannot be estimated.

WOOD-CUT ILLUSTRATIONS.

Six of the Reports derive great value from descriptions aided by means of wood-cut illustrations, fac-similes of sketches made in the Exhibition. It should be distinctly understood, these simply illustrate the application of a process, system of ornamentation, or forms which appeared well adapted to the purpose to which they were applied in articles exhibited.

As regards the value of these Reports it is not for me to speak; that, I leave to those who will peruse them. Of artisan readers I hope there will be many. I would be unfaithful to the Birmingham Chamber of Commerce, to the artisans who accompanied and confided in me, did I not bear testimony to the faithfulness with which each reporter discharged the duties of reporting. Readers seated by the firesides of pleasant happy homes, who peruse this volume written by their brother artisans, will scarcely realise the labour, the toil of travel, or the amount of work gone through by the reporters, the difficulties arising from a want of knowledge of the various languages spoken, habits of the people among whom they sojourned in the execution of their task, what long journeys they had in the Exhibition Building itself to collect, examine, and compare, each, the results of his own trade or industry, in a temperature which induces lassitude, and to which Englishmen are not accustomed; and there were attractions many, and pleasant entertainments not a few, calculated rather to distract than help the object in view. In the face of all these difficulties, the information was collected and embodied in the reports of the Birmingham reporters. Their industry is proved; fifteen reporters sent me unitedly 360 foolscap pages of MS. If my Lord Lyttelton had seen it, he would have been convinced that to the artisan population who sign with a × these reporters did not belong. The handwriting of twelve was very excellent, of three not so good, but still legible. What is attempted to be described is clearly described. In many of the Reports there is graceful and thoughtful writing. Several of them tell of the results arising from the education given in other lands, and the beneficial results seen in the intelligence displayed by their artisans. This, it must be remarked, is the result of national systems of compulsory education, where creeds do not lead to bickerings at School Boards, heedless of the cry rising from every lane and alley—"My people are perishing for lack of knowledge." Not a few of the reports refer to the superior methods of teaching drawing in other countries, and the superiority of that adopted by the French schools is clearly pointed out. Other Reports speak of the advantages arising from museums of objects of industrial art, the want of these, and one reporter asks "of what use is South Kensington to art workmen here (Birmingham), or in distant parts of the country?" That reporter is correct. Loan collections do not meet the wants of artisans in the provinces engaged in the production of what furnishes us with the gratification of taste, adds to our comfort, and largely increases the national revenue through their exportation. Robbed of all prestige or trimmings, take away sentiment, come to bare facts, the action of South Kensington is *nil* in the provinces and on their industries; its action has been similar to that of the little urchin who inquired if grandma liked egg-soup. On being answered in the affirmative, he informed her he was going to get an egg; he did—he boiled, kept, and ate it; he gave the soup (i.e. the water) to his grandmother. The boy who got the egg, kept, and ate it, is South Kensington; grandma is represented by the provincial industries. The mighty claim is shadowed forth in one and a-half millions of people visiting it annually—a very large proportion of which undoubtedly belong to London—their purpose amusement; of those who go for the purposes of getting instruction there are comparatively few. South Kensington in all its glory is the result of national money. Manufactures were ostensibly to be benefitted thereby. The great centres of industry, that work in metal, blow glass, convert clay into articles of use and beauty, or weave textiles for use and ornament, do not *directly* benefit by examples in that Museum. Let provincial artisans see to it, and ask, through their Parliamentary representatives, that examples to aid them may be selected from the Museum they have contributed towards erecting and furnishing, to aid them in their daily calling, render them more intelligent and conversant with what is good in industrial art, the plain fact being that grants for South Kensington in general do not get much attention paid to them in the House. Members are rarely up in art as applied to industry. "It is simple savage ignorance and priggish pedantry not to recognise the absolute necessity of examples of art easily consultable by the public, who are consumers; by the manufaturers, who are producers; and by the artist and artisans as students." Artisans! strike against the annexation of South Kensington Museum to the British Museum, but have from South Kensington examples in your own town, and in our own museum, where you can and may see what others did before you, and better than you in your own trade. Examples to be useful to you must be placed where you are living and working, to be practically useful. If your representatives express your wishes truly, and South Kensington is made to give up much of what it claims as its own, there will be enough left to amuse even a million and a-half of Londoners and visitors from the country, and Metropolitan manufacturers, their designers, and artisans will still have more than their fair share to study from.

I again revert to the Reports, and desire to impress upon readers, that they were not written by professional reporters, but by artisans—men who toil from morn, to eve, in factories and shops resounding with the blow of the hammer, the music of the turning-lathe, and file. The highest literary effort made previously by twelve of the number, in all probability, never reached beyond letters to father, mother, or friend: all, every one of the reporters, only received such limited education as was accessible to their parents to give them thirty or forty years ago. Each Report—all the Reports—illustrate what may be done by and through Self-Help.

The stern necessity of space compels me to limit the length of this Report; there is much that would have been said left unsaid, but "good wine needs no bush." The Reports will speak for themselves. Justice to the Birmingham reporters will be done in my own

Report, which will be published simultaneously with these, by the Birmingham Chamber of Commerce, my regret as to want of space is further increased by the same stern necessity compelling me to delete many paragraphs from the Reports which quaintly, gracefully, in some instances elegantly, told of incidents which occurred, habits observed, buildings seen, museums visited, and scenery passed through. The excision of these passages has been to me matter for regret.

Mutually participating in all the advantages enjoyed by the Manchester reporters, those of Birmingham desire to acknowledge the kind, and genial, and thoughtful attentions of Philip Cunliffe Owen, Esq., Chief British Commissioner at Vienna. Never were the wishes of a Prince more faithfully carried out or loyally obeyed. To that noble Austrian gentleman, Baron Schwarz,* who by word and deed

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* Among the many pleasing incidents which marked the visit of the English Artisan Reporters, there was not one more pleasant than that which occurred at the banquet given to them by his Excellency Baron Schwarz Senborn. On that occasion Baron Senborn requested each reporter to forward on his return to England his photographic portrait, with name, address, and the industry he reported upon. On their return, the Birmingham reporters held a meeting, at which Mr. F. G. Jackson (Reporter on Works in Precious Metals) suggested that the portraits asked for, instead of being sent separately, should be arranged in a specially prepared album; in this the Manchester reporters concurred and contributed, and sent their "cartes" to be introduced. The address which preceded the portraits was composed by Charles Hibbs, Reporter on Guns, aided by suggestions received from Mr. W. G. Larkins.

To HIS EXCELLENCY BARON WILLIAM VON SCHWARZ SENBORN, *First Director of the Universal Exhibition at Vienna.*

MAY IT PLEASE YOUR EXCELLENCY,

ON the occasion of the hospitable reception given by you to the English Artisan Reporters, you expressed a wish to receive from each one his photographic portrait with name and designation.

GREATLY impressed with the kindness that prompted such a wish, and with all the kindness bestowed upon us by Your Excellency during our visit to Vienna, we beg your acceptance of this Album as a mark of our respectful admiration.

THE WELCOME given to us by Your Excellency in the first hour of our arrival, the cordial sympathy you expressed for our object, and your princely hospitality, will never be forgotten by us. As the Director General of The Vienna Universal Exhibition, we regard Your Excellency's reception of us as the expression of the good-will of Industrial Austria towards English workmen.

WITH the most pleasurable recollections of that Magnificent Exhibition which has been the crowning result of Your Excellency's many years' labour in the cause of industry,

WE most respectfully subscribe ourselves,
Your Excellency's obedient servants,
WM. G. LARKINS,
Secretary, Society for the Promotion of Scientific Industry, Manchester.
W: C. AITKEN,
Representative of the Chamber of Commerce, Birmingham.

MANCHESTER AND BIRMINGHAM.
October 27th, 1873.

(Then followed the portraits of the various Artisan Reporters with their Autographs, and the subject each reported upon.)

The illuminations, floral and heraldic, and the words which formed the comacknowledged the British artisan reporters, and to them extended his personal hospitality and regard, their thanks are given. Professor Archer also gave of his knowledge; and the entertainments of Mr. Berger Spence, of Manchester, and of the English exhibitors under the presidency of Mr. W. Head (of Ransomes and Co.), are not, will not, be forgotten by the Birmingham artisan reporters.

Finally, the display of industry in the Universal Exhibition, at Vienna, the "mightiest since the world began;" the countries passed through, museums seen and visited, the honours gained and attentions paid them, will, it is hoped, not be without their influences on the future lives of the Artisan Reporters sent to Vienna by the Society for the Promotion of Scientific Industry, Manchester (to its able and energetic Secretary, Mr. W. G. Larkins, a very great measure of the success attendant on the artisans' visit is due—his zeal and determination overcame very many difficulties), and those sent by the Chamber of Commerce, Birmingham.

MAYFIELD, HEATHFIELD ROAD, BIRMINGHAM.
November 17*th*, 1873.

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mencement of the various paragraphs in the address were executed by Mr. Jackson (on vellum); the body of the address beautifully engrossed, the portraits arranged in sets of four, the album bound in dark russet-coloured morocco chastely decorated with gold: white satin linings and gilding enriched the interior of the boards. On the cover was introduced the monogram of Baron Senborn surmounted a baron's coronet, executed in saw-pierced metal, engraved, enamelled, and gilt. Every portion of the album was executed in Birmingham. At a meeting held on the completion of the album, it was determined it should be forwarded to Philip Cunliffe Owen, Esq., Chief British Commissioner at the Vienna Exhibition, for presentation. It was presented by him to Baron Senborn, who acknowledged its presentation as follows:—

Vienna, Nov. 14*th*, 1873.

BARON SCHWARZ SENBORN *to* MR. W. C. AITKEN, *Birmingham.*

"Until I send each reporter my photograph in exchange for the album received with much satisfaction, please to thank each of my Birmingham friends for their thoughtful and courteous present. The acceptance of their artistic work has been most grateful to me."

Leather, Harness, Saddlery, Whips, Portmanteaus, Purses, Pocket-books, &c.

By FREDERICK THOMPSON, *Foreman of Saddlery Works, Messrs. Ashfords and Winder, Birmingham.*

HAVING had the honour of reporting to the Birmingham Chamber of Commerce, in conjunction with the Society of Arts, London, on Leather, Harness, Saddlery, &c., at the Paris Exhibition, of 1867, and having been again selected by the Birmingham Chamber of Commerce, acting with the Manchester Society for the Promotion of Scientific Industry, as one of the artisans to report on similar exhibits at Vienna, I shall endeavour honestly and truthfully to discharge my duties in a manner that I hope will reflect credit on myself and the trade I represent.

In writing my Report on the productions of industry at Vienna and its Exhibition, and feeling in no way biassed or fettered in my opinions, I intend to compare the articles of the Vienna Exhibition of 1873 (on their merits only) with those of the Parisian one of 1867, carefully marking the progress made in the six years' interval—the novelties and specialities then introduced, if they are still in the market of competition, or cast aside as worthless; also noticing the more modern inventions of all nations, and describing them in as plain a manner as possible, by the aid of sketches or diagrams, wherever I find them to differ from our own in construction.

I do not consider it within my province to comment upon anything but what is really connected with the business I am delegated to report upon, unless it refers to the social position of the workmen connected with the branches I represent. It is my intention to confine myself strictly to these points.

I will, in the first instance, describe the articles connected with my business, as I have seen them in actual wear, *en route* to Vienna. Passing from Antwerp, through the first stages of our journey, the most prominent feature to my mind, and which struck me more forcibly than any other, was the remarkably handsome and powerful dray horses of Belgium. These horses (Fig. 1), which appear to be characteristic of the country, have short but finely arched necks, exceedingly high withers, an immense sweep in the back (generally known in the trade as saddle back), with massive, broad, fore and hind quarters, and altogether stoutly built in proportion. To fit these horses the collars must be from 26 in. to 29 in. long, and of great breadth. The cart saddles must also have wider bearings than our English horses require, and all the harness strapping cut extreme lengths. Poles, not shafts, are invariably used for single, as well as for pair horses. It is noticeable in Belgium, as in the other countries I passed through, that the collars of horses differ from ours more than any other portion of the harness; this is especially so in dray-horse collars, which are preposterously heavy.

Fig. 1 will explain the collar chiefly in wear in Belgium: it has large wood scroll harness (A), plated brass, a false collar underneath (B), thickly padded and quilted, forming a large heavy looking roll outside the collar nearest the horse's shoulders; the housing (C) is massive and square in shape, always maintaining the same position, viz., lying over the horse's withers. These collars are very fanciful, generally covered with brass ornaments, and the initials of the owner occupy the housing in letters of brass, about four inches in length. The reins to drive a single horse differ from ours in this respect, the driver having but a single strap (D) in his hand, while we in England have a double one. Sketch (Fig. 1) shows that the single strap (D) divides and forms into two when nearing the horse's collar; the connected reins (E) then pass over the housing, between the harness, and are secured to the bridle in the usual manner. I may here remark

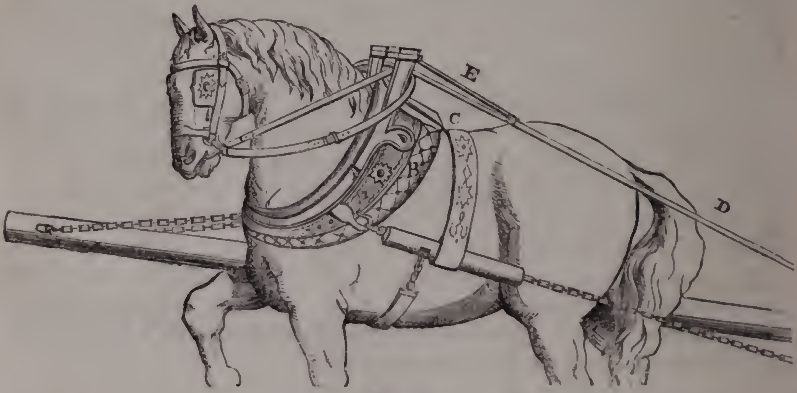

Fig. 1.

that I do not see any advantage gained by this system of driving; certainly a few feet of leather are saved, but safety and comfort are sacrificed; for if the driver wishes to turn his horse on either side, he must throw the single rein over the horse's back to the reverse side, and pull the rein; if he intends to stay the horse the force applied must be central; no economy of time is arrived at by this plan, but the reverse, as the action is slow compared with that required in using our double rein.

The Belgian omnibus horses are, if anything, poorer, and more razor-backed than our own, a sad contrast to the dray horses. The collars are the same in style as before described (but, of course, not nearly so heavy), fitted with false pads, but no housings; the traces are of rope, and the winkers square; in other respects the harness is similar to that used in England. The carriage harness of Belgium varies but little from our own in shape; Prince of Wales collars are usually worn, and this kind of harness is generally light made and well fitting. Leather, I find, on the Continent, is used for purposes seldom seen in England; for instance, the massive doors of that magnificent edifice, Antwerp Cathedral, are covered and padded all over with it; this is not an exception, as I found it in many places during my journey.

I find our Continental neighbours are behind us in acts of humanity, if we consider dogs used as beasts of burden to come under that category; for here we observed four-in-hand, two or more abreast, and single harnessed dogs, employed nearly all throughout Germany. The leather strapping for these ill-used animals is similar to the harness before mentioned, with the same class of ornamental collars, &c.

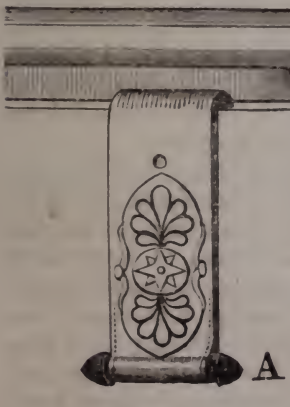

Fig. 2.

The leather straps used to open and close the windows of railway carriages in Belgium vary from ours in having a roller of wood (Fig. 2) secured at the end of an embossed strap, in such a manner that it ensures the free working of the roller (A) in the leather, thereby giving a better purchase to the hand in raising the window; it also prevents the inconvenience of mischievous persons forcing the end of the strapping between the window and the door-frame, making it a work of labour and risk of breaking the glass to release the same. As we journey onwards we find this wood roller is not used, for in Prussia, on the Bergisch-Märkisch Railway, a strap is used (Fig. 3) with a leather stop (A) attached, composed of scolloped leather of graduating widths wrapped round the strap three or four times, and firmly secured by sewing.

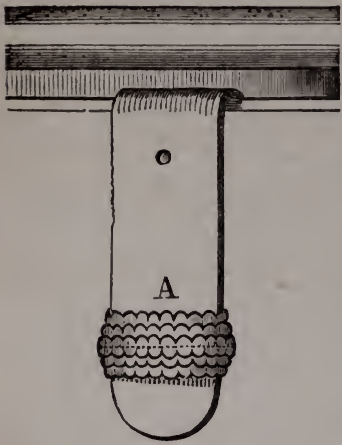

Fig. 3.

In Belgium leather has to give place to wooden slippers for the peasants; these slippers are carved out of the solid wood, and have an exceedingly ugly appearance, but I understand they can be bought as low as sevenpence per pair; this perhaps accounts for so many being worn (they are worn) by women and children, as well as by men.

Railway guards and ticket collectors in Belgium, Prussia, Saxony, and Austria wear neither belts nor pouches of any kind, and all tickets are collected whilst the train is in motion, by the collector walking along a board attached to the carriages. I need scarcely mention that this is a dangerous practice, and would not be tolerated in England.

From what I could observe of the Prussian dray horses, they are not at all to be compared to those of Belgium. The carriage horses are fine animals, and most of them wear breast-collars, both for town and country service. Leather strapping, I find, is used by the blacksmiths in shoeing horses; they do not hold the horse's hoof as our smiths do, but secure it firmly suspended by means of leather straps constructed for that purpose.

In Saxony, as in most of the other countries *en route* to Vienna, it is remarkable that very few vehicles with two shafts are to be seen, except for car or light trap work; it appears to be the general custom, even for single-harness horses, to work with a pole. This has an awkward and a dangerous appearance, for the poles are fixed so very near to the ground that they seem admirably adapted for the horses to kick over them; they also project about three feet in front of the horse. I also noticed the agricultural departments adopt this fashion. They have a cheaper (Fig.4), but I cannot say a better, way of supporting the shafts of their light single-horse carriages and traps in

Saxony. This is accomplished by means of a strap (A) at the extreme end of each shaft, and secured to the draught of the harness (B); the shafts receive no other support whatever. The result is, a swinging motion is observable. Neither is it so strong and evenly balanced as our own tug and back-band method. Saxony collars are entirely different in construction and shape to the Belgian or the English; they are in the pointed style (Fig. 4), and stand up a considerable distance above the horse's shoulders. Long breechings in best harness are the ruling fashion in this country, with a band over the horse's back and loins to support them.

In Dresden I observed troops of little girls, from six to eleven years of age, going to school with leather or canvas knapsacks strapped over their shoulders, the same as the boys. Nets with fine meshes, and of a white or drab colour, with edging of tassels, are frequently used in Prussia, Saxony, and Austria to cover the greater portion of the neck, shoulders, and backs of the horses, to protect them from the heat and flies, the latter being very troublesome; they are something of the mosquito species; their bite is painful. These nets are used not only for agricultural but for carriage horses.

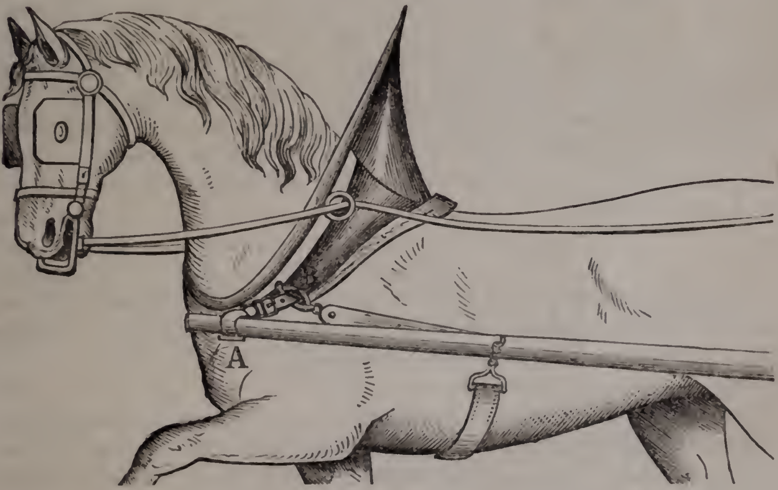

Fig. 4.

Oxen are much employed, I find, in the countries enumerated, for ploughing and other agricultural purposes: their harness consists of bridles with winkers, collars, rope reins, and traces.

All throughout the journey or in the Exhibition I did not see a single cart-horse collar of our shape and make. I cannot conceive why they are not used; they would be cheaper, not nearly so heavy, and, I think, more suitable for the warm climate than the ugly ponderous mass of leather work their horses have to carry. Some of the cart saddles are similar to our English make, but are raised on either side of the trough, necessitating more labour and material than ours, for what purpose I am at a loss to understand, except for ornament.

As I am now rapidly approaching the end of my journey I think it will be as well to call attention to the fact that the Continent, or rather that portion we traversed, is a very poor bark-producing country; oak trees are very scarce indeed, and the few I saw were tall and thin, not nearly so thick as some of the branches on our own English trees. Most tanners agree that oak-bark surpasses all other kinds of bark in producing durable leather. I feel particularly anxious to ascertain for myself what foundation the Germans have for producing good leather. The other trees generally are of great height, but of very poor substance, seldom exceeding the thickness of an ordinary man's body.

ENGLAND.

England's productions in leather work generally stood well at the Paris Exhibition of 1867 for solidity and durability. I consider England still maintains its position and prestige at the Vienna Exhibition of 1873.

Our exhibits are small in number, yet a host within themselves, compared to the acres of leather and leather work from Germany and Austria; nevertheless sufficient, no doubt, to give the foreigners an impression of what we can accomplish in style and quality. Still it is to be regretted we have not more exhibitors from this most important community, for I find London, Birmingham, and Walsall, the three greatest seats of saddle and harness manufacture in England, if not in the world, have only two cases of saddlery each. London is represented by only five exhibitors of leather, and other parts of Great Britain and Ireland muster seven exhibitors. This is the extent of our show in this the World's Exhibition.

England still holds her own, and is able to maintain it, for solid serviceable butt or sole leather of even substance and oak-bark tannage. Messrs. Evans and Co., of Bristol, and Messrs. Webb and Co., of Stowmarket, and other noted tanners, show excellent samples of leather produced in this country. The

London houses are represented by Messrs. Dixon and Son and Mr. J. S. Deed in japanned and enamelled hides and "splits," of a variety of grain, with excellent finish and pliability.

Messrs. Evans and Co. also show samples of hippopotamus hide, untanned, semi-transparent, and some tanned hide of the same animal; they also introduce a novelty in this remarkably stout leather by making it into boxes, fitted with locks and keys complete. The table to support the weight of all their exhibits is formed of this tanned hippopotamus hide, $1\frac{3}{4}$ in. to 2 in. in thickness.

Buff basils from this country are good and large, and of a soft nature. Oak-bark and soft white larch tanned basils are of good quality, so also are harness, skirt backs, bridle, and stirrup butts; hogskins, self-coloured and stained, are fine, and of good quality.

London is poorly represented in saddlery and harness; one case especially, Mr. B. Ellam's, does not appear at all to advantage, as it has only a back light upon it from over the top of the show-case; perhaps this is a benefit rather than otherwise, as the articles exhibited are not up to the London standard quality, either in material or workmanship; over-crowding with an assortment of saddles, harness, whips, and a host of other things, in almost indescribable confusion, is observable.

Mr. Moody, of Woolwich, exhibits his royal patent pack-saddle. (Fig. 5.) The first and most important feature in it is, that it is constructed so as to fit the back of the horse. The bars, or boards, of the saddle-tree are set at a sharp angle in the front, then the bars are twisted, so that while it grips the shoulders in front, it lies fairly on the back, giving an equal bearing over the whole surface covered by the saddle. The arches which connect the boards and form the head of the saddle in front, and the cantle behind, are made of angle, or T iron, the arch so turned as to present the flat part vertically and outwards, with the flange facing inwards horizontally ⊢ ⊣, on which the hooks, which are forged in one piece, rest, and are secured to the arch with two rivets; a blocked sole leather seat, as used in the Nolan military saddle, is riveted on. This I believe to be the best kind of arch that could be adopted, combining the greatest possible strength with simplicity, lightness, and good fit. The panels are quite unique, and a decided improvement on the old pattern saddles; the back is formed of tanned canvas, and is first stuffed with straw. Now as a level and smooth surface is a desideratum in these large panels, the straw is stuffed horizontally in compartments or flutes, large ones under

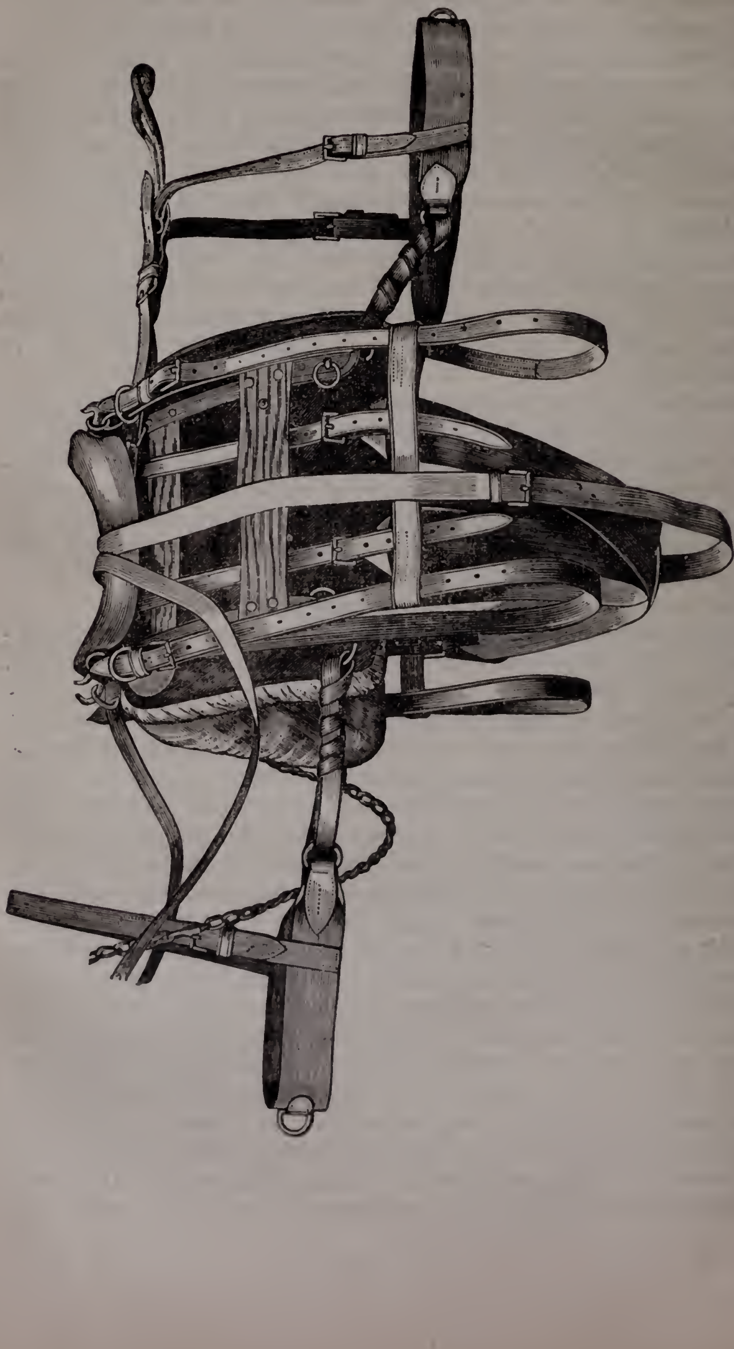

Fig. 5.

the saddle to take the bearings, smaller ones down the sides; the ends of the flutes are stuffed vertically, which renders it firm and prevents the straw from moving, or getting displaced, a most desirable and important end attained by simple means. The harness is very light indeed, being made of brown circular web, which would do exceedingly well for a dry climate, but which, if allowed to get wet, and not soon dried again, would rot very quickly. The weight of the saddle is 24 lbs.; with harness and baggage straps complete, 34 lbs.

Messrs. J. Drew and Co. show portmanteaus, trunks, and cases, also a lady's dress, imperial silk lined, and quilted throughout strongly, but of medium style and finish; also a small travelling-case with chess-board on the top: this is marked as purchased by his Royal Highness the Prince of Wales. A few hat-cases and bags comprise the remainder of their exhibits, which are chiefly strong and solid, but not of first-class quality, or finish.

Messrs. Swaine and Adeney, also of London, contribute a handsome show of whips of all kinds, and walking-sticks, which are convertible into driving whips by simply unscrewing and reversing a plain mount at the extreme end of the stick (similar to a fishing-rod joint). Four-in-hand whips are also exhibited.

Messrs. Brace and Co., of Walsall, and Messrs. Schletter and Co., of Birmingham, are the other exhibitors of whips; these are marked in both cases with the name of the well-known firm Messrs. W. and G. Ashford, of Birmingham. The above are the principal cases of whips sent from England. Those from London, Birmingham, and Walsall, are an admirable collection of fine quality goods; the mounts are solid, plain, and durable, and contrast strikingly with some of the massive, ornamental, and showy mounts in the other courts. Respecting the cases of whips just mentioned, especially the Birmingham and Walsall show, I noticed one thing which greatly marred the effect of their appearance, that was the exceedingly dirty and tarnished state of the mountings, which, to judge from what I saw, have not been cleaned for some time. Another conspicuous specimen of folly is worth recording, if only to guard against it at future Exhibitions, and that is in over-crowding the show-cases with goods, so that nothing is really seen to advantage.

Mr. W. Middlemore, who is the only manufacturer who exhibits from Birmingham, sends a handsome case of saddlery, which shows exceedingly well, all the more effective because not over-crowded, and every article exhibited is kept remarkably clean and in order. This collection alone will give foreigners a good idea of what is being done in this town; for when it is taken into consideration that the same class of workmen who made the articles exhibited frequently move from one place of business to another, it is fair to presume that the saddlery manufactured at one house of business in Birmingham must be similar in style and workmanship to that executed at other respectable establishments. Of course patents are an exception to this rule, and Mr. Middlemore excels any other exhibitor as regards the number of patent saddles; he shows no fewer than three distinct inventions, the most recent one being a "gent's patent arched metal-tree saddle" (Fig. 6), covered all over hogskin, and composed of a blocked iron seat (A) with wood bars (B) underneath, to take their bearings on the panel, or padding of the saddle; the wood bars are attached to or detached from the seat at pleasure, by a simple, yet strong contrivance; the panels can also be removed in a few seconds, without any trouble or inconvenience. Fig. 6 is a sketch of the tree without its covering, or padding. This invention is shown for the first time. The intention of the patentee is evidently to give elasticity to the seat of the saddle for ventilation, freedom from sore backs, and last, but not least, a more expeditious mode of manufacturing saddles by a subdivision of labour, not attainable in the usual method. Of course we cannot expect to find perfection in this saddle at present; the invention being altogether new, will require many improvements before it can be pronounced a perfect saddle. Nevertheless, great credit is due to the inventor, Mr. Clay, who has succeeded in bringing out a saddle on a new principle, and he will, no doubt, effect all the improvements required in detail to convert it into a useful article. A patent Albion gig saddle

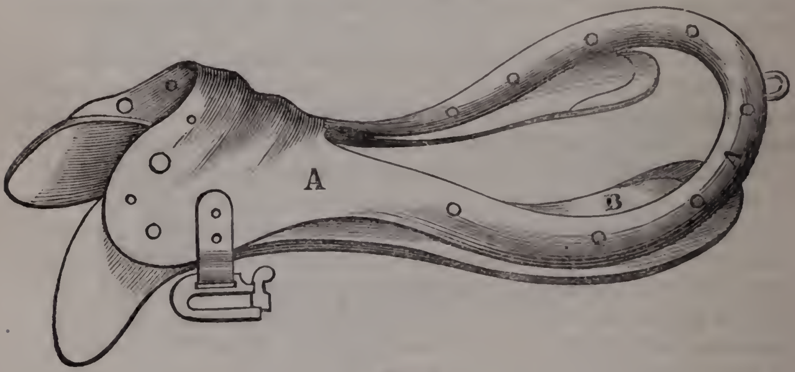

Fig. 6.

(Fig. 7) is also exhibited on a similar principle, with block metal seat (A) and blue enamelled leather centre, silver-plated beading continued all round the cantle, and forming the hook for the bearing-rein; this blue centre is rather showy, and will only suit foreign markets. Another is shown with black japanned centre and brass bead (B), neat and good, suitable for the home trade. The next invention is one patented some time back. It is very light, full shafts, self-colour, East India saddle, designated the "Patent Albert spring-seat saddle" (Fig. 8). The patent consists of a number of spiral springs (A), firmly secured in the webs (B) of the seat of saddle to give the required elasticity. This saddle is a picture, almost faultless, both as regards the hogskin and the workmanship. The other novelty from the same house is the patent Victoria coil spring-seat saddle (Fig. 9), first time exhibited. This is rather different from the others in being a second-hand saddle, with a coil spring (A), and has stood the test of a whole season in the hunting field. An Australian (Sydney) saddle I must not omit to mention (as it is always a pleasure to praise rather than to condemn) for first-class hogskin and workmanship; it is so evenly stained, and so perfect in fit, and carefully constructed for ventilation, that I have no hesitation in stating that this Australian—and the light East India saddle before described—are not to be surpassed in the Exhibition. A plain, strong, jockey-union, Somerset, South American travelling saddle, with holsters, valise pad, and side-bags complete; a graceful lady's,

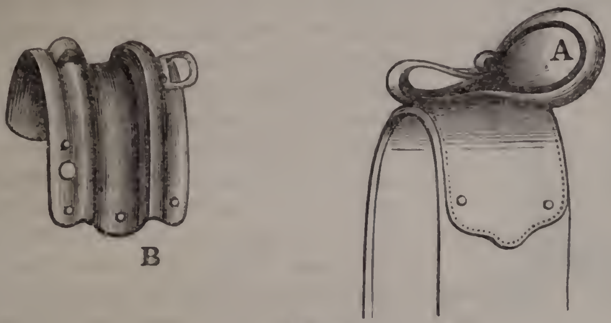

Fig. 7.

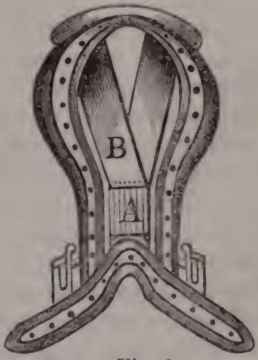

Fig. 8.

and a neat racing saddle, constitute the remainder of brown saddles exhibited, all of which deserve praise for skill and material. The bridles and fittings to match all the saddles are of the same class of carefully selected articles, a charming contrast to the London exhibits. Harness also is shown, Cape-curricle and horse, stained, with brass fittings; Australian cab harness, with nickel mountings, fitted with their patent saddle; a set of single-horse broughams, silver on German wire whole buckles, and a set of light American buggy harness, square-pattern mountings, all of which are well made. Mill-banding, fire-buckets, hose-piping, helmets, &c., are also shown. Portmanteaus and "railways" figure likewise in this case from Birmingham. One of the latter has no strapping whatever outside, for convenience in opening and closing; springs are used instead. This will do for small work, but not for large trunks, which are greatly strengthened by the strapping which encompasses them. Another portmanteau is shown, with a registered bolt inside to secure the door, in place of straps. The workmanship in the portmanteaus is not so good as in the other articles; carelessness is shown in the ornamentation, by overheating the tools used and burning the leather, as well as other faults which are plainly observable.

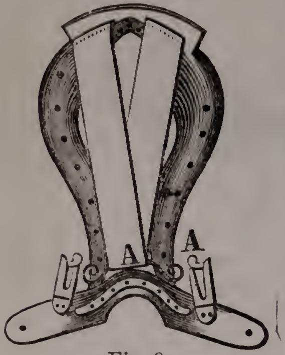

Fig. 9.

All pretensions to show in this collection of saddlery has been carefully avoided; plain solid serviceable work has evidently been the object of the exhibitor. I also noticed that there is more of the machine element in this case of goods than in any other in the Exhibition. Nearly all the articles are marked as sold to persons of high rank. In my opinion this collection deserves high honours for both material and workmanship.

Messrs. Schletter and Co., merchants, of Birmingham, show a fine collection of saddlery, cigar-cases, &c., chiefly made in Birmingham; but these goods do not appear to advantage, being overcrowded. Their solid calf purses and pocket-books, with a fox's-head trade mark (makers, Ashfords and Winder), scarcely show at all by being put on the floor at the back of the other goods in the show-case. This is to be regretted, as I did not observe articles of this description in any of the other courts in the Exhibition.

Walsall has no cause to regret its show of saddlery and saddle-trees, contributed by Mr. Christy. His exhibit is remarkably good, with the exception of a few details. The arrangement in the show-case is admirable, no overcrowding, every article exhibited being distinctly seen to advantage, and the whole so clean and carefully attended to, that I did not observe a single mark or soil upon them. This is another favourable contrast to some of the other houses in the British Court. A lady's saddle, white doeskin, and quilted all over in design, sewn with blue silk, of good shape and finish, is a delicate piece of workmanship; but if the rudely drawn imitation of a butterfly, stitched in the design on the heads, had been omitted, it would have shown greater taste. There is really no scientific arrangement in this butterfly business; in other respects, excepting an ugly border in the quilted work, it is a good soft and easy saddle. Another lady's saddle is shown of good workmanship, but I cannot truthfully state the same of the hogskin, which is too poor and spotted for best work. The hunting saddles are creditably made, but the curve in the hind facing is destroyed by nailing in the panel without exercising sufficient care. Several other saddles exhibited are also well made, but the hogskin is not so carefully selected as in the Birmingham saddles. In this collection is a best Australian pack-saddle, stained, and the best in this case for shape, precision, and finish; the curves are better attended to, and the panel fits with accuracy, which is not so in some of the others. All the saddle-trees are of excellent quality, and fitted with nickel plates that will not tarnish or corrode. Notwithstanding these few minor inequalities, it is, on the whole, an exceedingly good collection.

Messrs. Brace and Co., Walsall, have greatly marred the effect of their case by having too many articles pressed into too small a space. One of the most prominent saddles to be noticed is a lady's, with doeskin eaves, of good material, as far as I could observe, and of fair workmanship; also a lady's, plain, of good finish, but of second quality hogskin; a Somerset, and a military saddle, some harness, &c., all of which, taken collectively, are of good quality as regards material and manufacture. The stirrup-irons, spurs, bits, &c., appear of good quality, but are in an exceedingly dirty and tarnished condition.

Messrs. Lennan and Co., of Dublin, show rather a large quantity of saddles and harness, but nothing really remarkable.

This concludes my observation in the British department of the Exhibition. I believe I have omitted no article novel in design, material, or construction, and have sketched only such as come under the head of inventions.

AUSTRIA.

Before describing the exhibits of this great nation, I wish it to be understood that sketching in the Exhibition is strictly prohibited, unless permission is granted by each individual exhibitor. To run counter to this law is to place oneself in jeopardy of the authorities; but how is it that foreigners—for the French were the same in 1867—refuse us this concession, when perfect freedom was given them (if I am rightly informed) at all our past Exhibitions?

In the manufacture of saddlery and harness, I find from careful inquiry we have no need to fear competition to any serious extent from Austria, for I am informed from a native of Vienna, and one in the business, that there are no wholesale houses at all in the city or in the provinces, that he was aware of. They are what we call in England front shops, or home establishments. I am informed that the London saddles are held in high repute in Austria. They buy their best saddles from that market. Birmingham and Walsall come in for some of the cheaper class. I find the Viennese have a strong prejudice against any best work, except of London manufacture. The London labels on saddles work miracles on the Continent, for many of the reputed town-made saddles are supplied to London houses from Birmingham and Walsall, labelled and by them distributed all over the world. The Vienna saddlers complain greatly about the recent advances in English saddlery. They are at the present time straining every nerve to manufacture more saddles now than formerly on account of this advance. The saddlers, harness, portmanteau makers, and the men in the leather trade generally, work for weekly wages varying from 16s. to 24s. per week; hours of work from 6 a.m. until 7 p.m., but they do not work at the same rate as our workmen. Their day of payment is Saturday. In some of the establishments work is done on Sunday same as any other day. Trade societies are in existence, but the men do not band well together. A strike took place in May last among the saddlers at Vienna for less hours and more wages. The men did not succeed in their efforts, but returned to their work at their old hours and wages. The workmen in the trade generally are sober, but not industrious. The employers give them poor encouragement, which makes them neglectful and careless. If they were better managed, a much better feeling would prevail between employers and employed than now exists. The workmen are fond of smoking, and beer is their chief drink, even for breakfast. It is weak and cheap, but of good flavour, and well suited for the hot climate of Austria (perhaps, the beer being so weak accounts to a certain extent for the sobriety of the trade). I may add that I saw not one single case of drunkenness in Vienna during my stay there. The workmen in the leather trade are chiefly married men, but are not a saving body,—in fact, their earnings are too small to keep a family and to make provision for old age. Women as a rule are not employed in the trade. The men have to do their own seaming and stitching; sewing machines are rarely used in any of the saddlery establishments. Apprentices usually serve five years for board and lodgings, two apprentices being engaged at each shop. Some of the military work is manufactured at the arsenal in Vienna. From what I could gather, there are no English workmen employed in the saddlery trade; and if they will take my advice, they will keep away, for I am certain that neither wages, living, nor climate will suit them.

Some of the respectable workmen in the trade reside a few miles outside the city, where they can obtain cheaper lodgings, at from 1½ florins (3s.) per week and upwards. The remainder muddle together in one room in Vienna, spending a great portion of their time with their families at the cafes.

As it will not be necessary for me again to refer to the element of labour in Austria, I may be permitted to remark that nothing pained me so much as to observe the degrading occupations to which females in the lower classes are subjected in Vienna. Young girls from 14 years old and upwards are constantly seen climbing ladders with the men, carrying up bricks and mortar for building purposes, dressing bricks, or breaking stones. I saw from 40 to 50 women, some with babies on their knees, and other portions of their family playing about, whilst they were breaking stones. Women we also saw at work with the "navvies" on the railways and in the quarries, and almost everywhere else where men are employed; even in the Grand Rotunda of the Exhibition, Bohemian girls were engaged carrying up articles for building purposes.

In the Austrian as in many of the other foreign departments in the Exhibition, I must refrain from mentioning the names of exhibitors on account of their extreme length.

Respecting the show of leather in the Austrian collection, I find it varies considerably, therefore I will not particularise any one class, but give a general opinion respecting the whole exhibits. Their brown and black calf and other light leathers are of good quality generally, and I think equal to ours; but their hogskins are poor, harsh, horny, and not well adapted for saddle work. Stirrup and bridle butts, skirt and harness backs, are also inferior to the English, in being loose, rough, spongy, and not of good tannage. I also noticed that their sole leather is not equal to our English manufacture, although some of it is of great thickness, but it is generally loose and wanting firmness. In japanned and enamelled hides, of a variety of grains, they manage much better; in fact, they appear good japanners; their hides are soft, smooth, pliant, and have an excellent face, or finish. Fancy skivers, roans, and moroccos, of many colours and grains, for purses, boots, &c., are of much finer finish than those shown in 1867.

Austrian saddlery is similar to our English make, and appears better than previous exhibits, yet will not bear comparison with those in the English Court for quality. Most of those shown are of middle-class workmanship and material. On the whole the Austrians are not good saddlers, but no doubt they will gain a wrinkle from our exhibits. The prices of their saddlery are enhanced in Vienna by the men having to do their own seaming and sewing, and the sewing machine element not being much in fashion. A lady's saddle of inferior make and material, quilted all over with small doe-ears, in safe and heads, is marked 95 florins; a racing saddle, full shaft, poor and heavy, 30 florins; also a gent's hunting saddle, about our second quality, 50 florins, and so on in proportion; but, of course, these are Exhibition prices. Only two novelties are introduced in the saddlery department throughout the Austrian Court. One is a lady's saddle (Fig. 10), with the near horn or head (A) constructed so as to fall down, by means of an expanding gusset (B); the intention of this invention is to give greater facility to the rider in mounting and dismounting; the saddle has no leaping head. The other novelty is a gent's saddle (Fig. 11), arranged in such a manner that the rider is enabled to tighten the girths

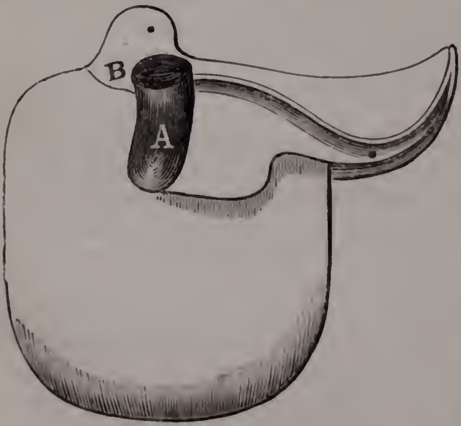

Fig. 10.

of his saddle, without the inconvenience of dismounting. This is accomplished by means of a key, fitting on a square (A) in the skirts; in fact, there are two squares on either side of the saddle, each protected by a circular metal plate working on a rivet. I cannot offer any opinion on these inventions, as I could not find the person who had charge of the cases to obtain, required permission to inspect them. I went repeatedly, in company with an interpreter, to get an interview, but failed each time. Some of the ladies' saddles were showy in the extreme, being quilted all over with fancy needlework insertions in design, some with horses' heads, and other animals.

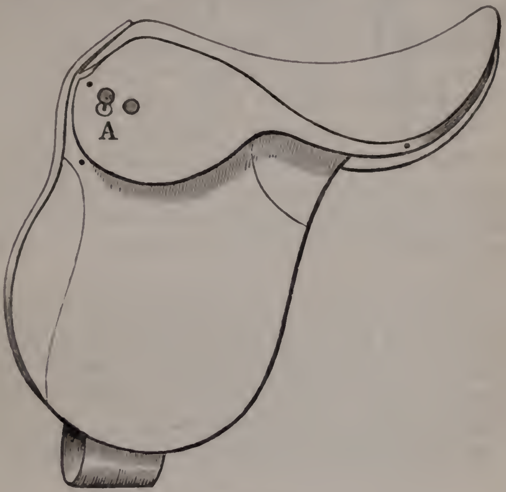

Fig. 11.

Messrs. Wikede and Sons have a magnificent case of saddlery, capacious, and composed almost entirely of glass; it is, for workmanship and material combined, one of the best in the Austrian collection. Several ladies' saddles are shown with showy insertions, but, nevertheless, well made. I noticed that the designs for the quilted work were carefully and well drawn, a contrast to a great amount of the old-fashioned patterns put on our English saddles. The racing saddles in this collection are made very light in weight, some only 1 lb. complete. A lady's saddle, with seat and skirt in one piece of hogskin, is well made, and shows what can be accomplished by some of the Austrian saddlers.

Respecting the harness exhibited, it varies in quality as much as the saddlery, some being fairly made, and others the reverse. Tilbury tugs are very much used in Austrian light harness, and patent leather fronts, sewn with flat silver wire, are frequently seen; also fronts neatly worked with white or coloured whalebone in design, are very tastefully executed. It is evident, where neatness of design is required, the foreigners can manage it to perfection. Their favourite style for harness furniture is the cable pat-

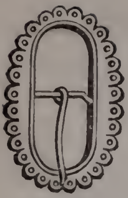

Fig. 12.

tern, with whole buckles. Another kind is a fancy scolloped pattern, with holes pierced all round the buckles (see Fig. 12). Most of their furniture is of a showy nature, with very few plain patterns like our home trade. The Austrians do not manufacture such good harness mountings as our English makers, but surpass us in having a greater variety of fancy patterns. Hoods of enamelled leather, and quarter cloths of the same material, are worn in some cases underneath the harness, placing the horses, as it were, in deep mourning. Very light Prince of Wales's collars are very fashionable here for carriage horses. An elaborate set of white enamelled state-carriage harness, with double-gilt buckles, and one mass of ornamental chain and tassel work, with pads and collars of the same material, padded with green quilted cloth, and another set of black harness of a similar nature, nearly all sewn in design with flat gilt wire, reminds me of the patience of the Spaniards, who surpass all nations for showy state harness. Hackney bridles, in some cases, are showy, yet well made; a few especially so, in light coloured hogskin, and lined underneath with blue velvet, showing a very narrow even margin

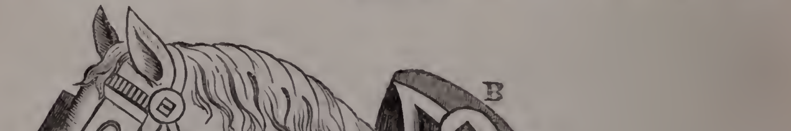

Fig. 13.

throughout the strapping. Pressed or stamped loops and pipes are invariably used in foreign harness. I found them in nearly every department of the Exhibition. Harness docks are much longer than ours, and of extreme thickness. It will not be any exaggeration to say that they are thrice as thick as we make them in England. To crown their efforts in ornamentation, I must refer to their dray-horse harness (Fig. 13), which is mounted with immense round double breaks (A), seven inches long, and five inches in diameter, fitted with two tongs; the ornaments are three and four inches in diameter, and collars (B) of great weight and peculiar shape, with quilted false collars (C) underneath.

They make a great show of mill-banding, from 1 in. to 24 in. wide; it is well and firmly made, similar to ours in manufacture, some being constructed by cutting the leather into long strips, about $\frac{3}{4}$ in. or $\frac{7}{8}$ in. wide, and firmly fixing them together, so that when complete only the edges of the leather are visible. They make this kind only where great breadth is required.

The whips in the Austrian department are conspicuous more for their variety of mounts than for their sterling value. In some of the cases very poor whips are shown, and in others of much better quality, both in workmanship and material, but not equal to the English in best work. Rhinoceros-hide stocks are frequently met with; also all that portion of the stock forming the handle is wire-worked in many instances.

In dressing-cases, bags, purses, pocket-books, and other fancy articles of a variety of patterns and neat manipulation, I must give them the credit of surpassing us, and all such light leather work. They manage somehow to turn fancy goods out in a neat, clean, and tasty manner that our English workmen cannot accomplish. I did not observe any solid calf purses, or pocket-books, as are made and in such high repute in England.

I will now speak of their "railways" * and portmanteaus, which our English makers can excel in solidity. I noticed one in particular—a 27-in. best solid portmanteau—standing on its end, with a few articles on the other end, certainly not of very great weight, yet sufficient, by the pressure, to crush the portmanteau out of shape. This is a sample of their solid work. A "railway," made of light hogskin, in our own style, was well made; and so I found generally throughout the Exhibition, that where light leathers are used in manufacture, the Germans can manage them to perfection. The fashion for

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* "Railway," in Saddlery, means cases used for packing clothes, &c. in, for travelling.

travelling appliances on the Continent is not so much in our style of solid leather work, but composed of massive wood boxes, covered with cloth or light leather, with exceedingly showy metal mountings, brass bands, and other ornamentations. Fig. 14 well illustrates the style of trunk of this description, which is usually fitted with drawers, trays, and divisions. Some of these articles are 4½ ft. long by 3½ ft. deep. Most of their knapsacks, I find, are made of skins, dressed with the hair attached. Some are fairly made, others the reverse.

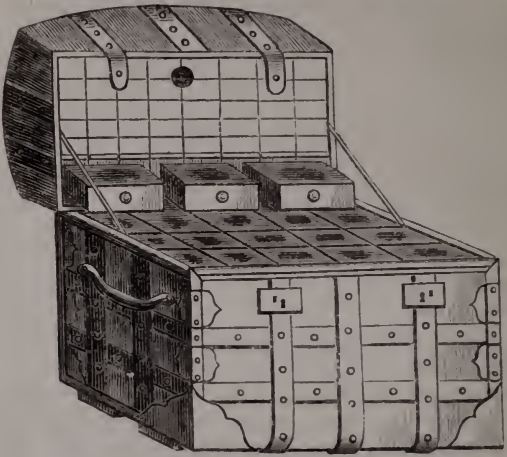


Fig. 14.

I need not describe the exhibits of Hungary or Roumania, as the remarks made on the Austrian exhibits will apply to both these countries.

PRUSSIA.

The show of leather and leather work from this country is great, but I failed to notice any marked improvement since its magnificent show at Paris in 1867, especially in saddlery and harness, which stood remarkably well for material and workmanship. Perhaps the unsettled state of the country, owing to the Franco-German war, may account, in a great measure, for their not making the progress one might expect to find. Notwithstanding these drawbacks, there are excellent samples of japanned and enamelled leather, of good finish; the calf and fancy-coloured work are also of a first-class character. I also noticed the japanned cloth was so near the appearance of leather, that only an expert could detect it. As for those of our English workmen who are under the impression that no one can touch us in light leathers, or in saddlery, harness, or fancy-bag work, let them go and see for themselves such a collection of leather and leather work as is now exhibited in one of the out-buildings in connection with the Vienna Exhibition, and I feel confident they will soon change their opinions, and come home with an acknowledgment that we are very far from having the whole of the leather trade in our own hands. Prussia will, in my opinion, be our greatest competitor in leather and leather work; for it appears to be the nearest approach to our English work I have met with on the Continent or in the Exhibition. Their saddles are of good shape, make, and material, but I did not observe any new invention worth recording, neither did I find any saddles or harness of such design as those exhibited in 1867. Harness in this collection is good, and not quite so showy as former exhibits. My impression, from careful investigation, is that the Prussians are rapidly throwing off the showy, outward ornamentation of their goods, and aiming at plain, solid, durable work, which are really the characteristics of English work. The collars and pads of the carriage horses are exceedingly light and neatly made. Respecting their bags, dressing cases, &c., &c., it would only be repetition to describe them, as they appear to be an exact counterpart of those previously commented upon in the Austrian Department.

FRANCE.

Of course the exhibits from this nation are considerably smaller in number compared to their magnificent display in 1867 at their own Exposition. Nevertheless, I must admit, it is a good show at Vienna. I am of opinion that the French manufacturers are determined not to be behind any nation in the race of competition, for I perceive the quality is still kept up in their light leathers ; also their patent and enamelled hides would not disgrace a first-rate London house; they are smooth, soft, and have a splendid finish.

In heavy leather they have made excellent progress. In harness, bridle, and stirrup belts, they are not yet on an equality with the English makers; they will still have to persevere with this class of goods before they arrive at perfection. Of course it depends greatly in the currying process, as I find a great many of their hides are now of English tannage. Their fancy leathers have a striking effect in their artistic arrangement ; but, apart from this, they are of fine quality and colour. Calf-skins, black, self, or coloured, are first-class, and some of the patent leather is painted in beautiful design. In hogskins they cannot compete with us for quality. A new grain is shown for leather, being an imitation of a crocodile skin, showing all the scales; it has a nice effect on some articles, but it is too large a pattern for small purposes.

In brown saddles, the French improve, but not very rapidly; the inventions introduced in 1867 have entirely disappeared, and they have nothing new at Vienna worth recording. The only approach to anything different to what they have shown before is a girl's pilch with the leaping head screwed through the bottom of the near head; it is an old English pattern, but now quite out of date in modern saddlery.

Harness in this collection is fairly made on the whole, so also are the portmanteaus, cases, &c. In the whip exhibits an improvement is apparent in design, but the show of these necessary articles is very small indeed. Millbanding is not at all well executed in the workmanship; it is not nearly so good in this respect as in the German or English departments; the chief failing is in the sewing, which is not well pulled in, either in thread or in lace-work, the stitches generally lying loosely on the surface.

RUSSIA.

Russia contributes leather peculiar to that nation only. No other country, I understand, has ever been successful in manufacturing Russia leather. Many attempts have been made, but I believe all resulting in failure as regards the lasting qualities of its scent; for in true Russia leather the scent never departs from it. Moroccos, sheep, calf, kid, and a wonderful amount of furs are displayed; also shoe leather of all kinds, and generally of a fair quality, but not so good as the German leather.

The gig and carriage harness is of the same character and style as that exhibited at the Paris Exhibition, viz., extraordinary narrow strapping, such as ⅜ and ½ inch wide, and of great thickness, but I find they have relaxed a little in our direction, as some of the harness is exhibited with ¾-inch bridles, and the other parts in proportion. I also remarked that the ⅜-in. strapping was not so thick and ugly as formerly shown. I cannot say I admire the Russian style of harness; at least the flashy portions of it. I will describe one set of horse harness of this character. It is completely covered with studs chiefly of ⅝ in. diameter, sewn or riveted on the strapping so that they nearly come into close contact with each other; the noseband, 2 in. wide, is also covered with them; and the harness altogether is mounted with tassel, fancy chain, and other ornamentation. The collar wail or pipe part way down is formed of polished wood, the remainder of leather, and is generally very light in appearance.

The harness mountings in this collection vary from our patterns more than any other nation ; for instance, the terrets have very peculiar eyes, turned the reverse way to ours when in use. I cannot conceive how the reins are to pass through them. I also noticed polished wood, fitted with strapping of a semi-circular shape, but for what purpose I confess I am at a loss to understand. There are many points connected with their harness past my comprehension, to arrive at a just conclusion respecting the fitting of this harness ; it should be seen in wear, instead of viewing it as it hangs in confusion in the Exhibition. Military harness is strong, and every strap is deeply fluted. Fig. 15 is a section of a strap of this peculiar harness. The collars are of an immense strength, with part polished wood pipes, and the traces cut double width and turned over similar to a flat dock : these are not so strong as an ordinary sewn-made trace. Tilbury tugs are also used in this country's display.

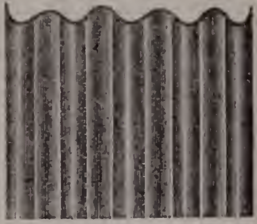


Fig. 15.

The riding saddles are few in number, with poor hogskin and middle-class workmanship. I observe they are all hand-sewn ; so also is the harness.

TURKEY.

Turkey has only a small show at Vienna, if that is all which is contributed in the main building of the Exhibition. The saddlery is similar in style to our English, but it is poor and ill-formed, and composed of bad material. We must not take this small show to represent the Ottoman Empire, when we have seen such excellent samples of workmanship and material at a similar Exhibition, so short a time back as in 1867. The saddles of Oriental celebrity are too elaborate for me to describe, being composed of silks, velvets, or cloth, with gold and silver embroidery, and fancy tassel work richly executed, and quite out of our line of business altogether. One bridle is rudely constructed, but has small sea-shells studded all over it, with the addition of many bells and tassels. Leathers contributed are of a fair quality, especially those in fancy colours. I cannot help thinking there must have been more saddlery, &c., from this great nation, but having no general catalogue to refer to, the number of exhibitors being large, and my time in Vienna but of short duration, I found it would only permit me thoroughly to examine all the exhibits in the Exhibition, and a few only of the numberless outbuildings in the grounds, which are, in fact, exhibitions of themselves.

SPAIN.

To the Spaniards I must again award a "leather" medal for their great patience and perseverance in fancy raised work; they certainly eclipse all nations for this class of ornamentation. A lady's saddle, of elegant design, with silver-tipped pocket, is one mass of embossing; even the facings are not forgotten. Other saddles are produced by cutting out the designs in coloured leather and sewing them on to rich velvets in beautiful contrasts; these are remarkably well done. A few of the riding saddles are in our style, and others quite different (see Fig. 16). The harness and bridle work is all of the same ornamental character, but only a small quantity is exhibited.

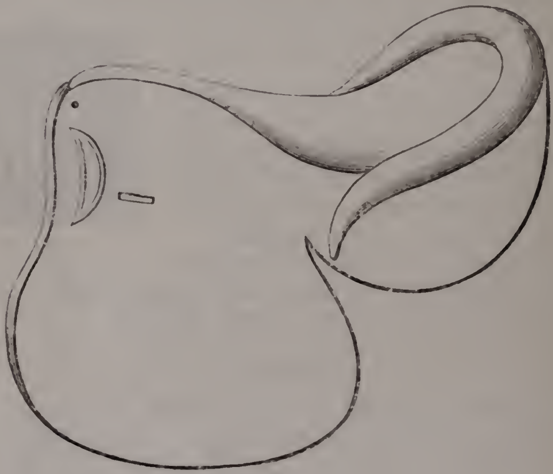


Fig. 16.

If a greater number of our English workmen in the trade had an opportunity of seeing the Spanish saddlery, they would, no doubt, be benefited by the lessons taught in graceful curves and general harmony of design. We are, I am reluctant to confess, far behind our Continental friends in originality of design; for instance, some of the patterns in the quilted work of English saddles have been in use now for half a century or more; it is exceedingly rare to see a new design. This is to be regretted, for why should we in England not try to excel in the beauty, as well as in the solidity of articles ?

ITALY.

In the Italian Court, as in many others in the Exhibition, I laboured under a disadvantage to get a fair view or touch of their leathers, for they were hung up so high that it was next to an impossibility to judge with any degree of accuracy of their merits ; but in the few I could well examine, I came to the conclusion that the Italians will have to make greater exertions to attain to the position of the English and Germans in the leather trade.

The brown saddlery is similar to our English make in formation, but not in material or workmanship. Harness showy generally, in some instances gaudy, with massive mountings and extra wide silk fronts and large whalebone rosettes, tolerably well made. Some of the harness-makers have caught the contagion from the Spaniards in embossing, but not with the same amount of patience, as the Italians do not sew their raised work.

Respecting the portmanteaus and trunks exhibited, one would almost fancy the workmen had served a portion of their apprenticeship at the cooperage, for they put so many hoops around their work, and what with hoops, clips, corners, and metal-plates, I must really give them the credit of surpassing us in metalising their work. It is observable that many of these trunks have two hasps in one lock ; this is an awkward arrangement, for we in England find one hasp quite sufficient to manage in locking up a portmanteau. Most of these articles are of great size, being four by three feet, and some even of a larger size. All are of fair workmanship.

SWEDEN, DENMARK, AND NORWAY.

From these countries we have a fine collection of leopard, tiger, black and white bear, and other skins for rugs and mats. The leathers contributed are chiefly of second-rate quality. Reindeer harness is very similar to that exhibited at Paris in 1867, being composed of a plain brown bridle, edges bound with red leather, a band of similar make round the neck to carry bells, a rudely-made collar with a plain back band round the body, one only rope trace passing from bottom of collar between the fore-legs of the animal, thence through a ring in centre as belly-band, and so on between the hind-legs, and secured to the front of the sleigh in the usual manner. The whole of the articles from these countries are very meagre indeed, so far as leather and leather work is concerned.

BELGIUM.

In writing of the exhibits of the beautiful country of Belgium, it will be only just to speak in words of praise of their collection of leathers. They have excellent samples of sole, patent enamelled, calf, and other leathers very similar to our own English manufacture, and seem to make rapid advances on us in this important branch of industry. In saddlery, harness, or whips, I saw no exhibits whatever.

SWITZERLAND.

About a dozen portmanteaus are exhibited from Switzerland of gigantic proportions, similar to our English manufacture, but with considerably less strapping; they are of good quality and workmanship. I find a custom prevails in this country to throw up the edges of the portmanteaus, and, by inserting strips of leather inside, giving them the appearance of extra strong, solid work. These broad edges are stained of a conspicuously bright red colour, so that anyone unaccustomed to the trade would imagine they were made of very stout leather indeed. Fig. 17 is a military saddle.

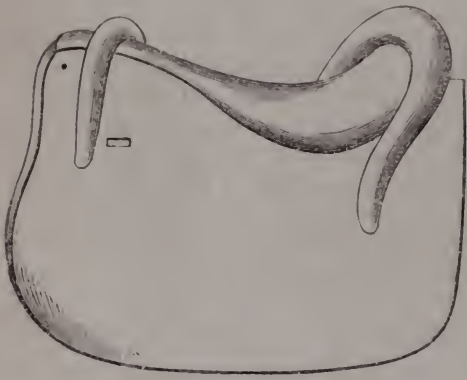


Fig. 17.

GREECE.

A splendid though small collection of embroidered work in gold and silver design on velvet saddles, entirely different from our manufacture; also a few railway portmanteaus of fair workmanship. The leather exhibited is of medium quality.

EGYPT.

In saddlery only a few made of leather are shown, all of which are of very inferior quality—rough and ill-formed. The saddles for camels are richly embroidered on velvet in gold and silver lace. In the grounds of the Exhibition the Egyptians show the manner in which they raise their water by means of oxen. This is accomplished by harnessing the oxen with a leather bridle, with cup-shaped winkers, to blindfold the animal, and a rudely constructed collar, from the top of which a rope is attached, and connected to a cross of wood similar to our thrashing machines, which communicates with a large wheel fitted with buckets similar to our river-cleansing appliances.

UNITED STATES OF AMERICA.

In this court only a very small collection of leather work is observable, and nothing whatever out of the ordinary style, with the exception of the edges of the portmanteaus being turned up and riveted with copper rivets after they are sewn in the usual way; this adds greatly to the strength of these articles. The sewing-machine element is more conspicuous here than in any other department of the Exhibition (excepting the Birmingham case) for saddle work. I noticed the panels, quilting, and raised heads all sewn by machine labour.

BRAZIL.

Harness from Brazil is a poor collection, badly made, with poor plated mountings. Coats, vests, trowsers, and broad-brimmed hats are exhibited made of leather. The saddlery also is poor and slovenly made, and the worst exhibited throughout the Exhibition. Some are made in hogskin with velvet insertions, showy, but of wretched workmanship. The "railways" and portmanteaus are painted in panels nearly all colours; it is evident from their exhibits that they are fond of showy colours in Brazil.

JAPAN.

Nothing particularly to notice; simply a few furs and skins exhibited, and a very small amount of leather work.

INDIA.

The Ordnance Department (Cawnpore) send excellent samples of saddlery similar to our English military work, but, of course, made adaptable to the climate of that country; also samples of buffalo and cow hide, drysalted with the common salt of the country, and hides of the same description limed; others grained and shaved. They likewise contribute highly instructive specimens of buffalo and cow hides, showing the results of the various stages of tannage from one month until seven months consecutively. It will be observed that, at the end of the first month's tanning, the buffalo hide especially has a very hard, horny substance in its centre; this is noticed more particularly when cutting it, which is attended with some difficulty; and examining its section, this horny substance decreases in proportion to the amount of time it remains in the tan-pits.

Our Colonies (New Zealand and Australia) send but a very small display of leather goods; their hides are largely branded, and are of a very red tannage.

CHINA.

From China we have fine samples of skins and furs, but only a very few saddles, rudely constructed, and complicated in a variety of coloured cloths.

As my Report is now concluded I cannot allow the opportunity to pass, without expressing a wish that all English workmen in the leather trade will endeavour, by constant application, persevering industry, and good workmanship, to assist their employers to hold their own against foreign competitors; for rest assured—although many in the trade may scoff at the idea—the French and the Germans are closely contesting with us for the supremacy; their japanned and enamelled hides and other light leathers are beautifully finished; also their saddlery, portmanteaus, and harness work, which are, on the whole, fairly executed, prove this to my mind. Then their fancy articles, such as purses, pocket-books, bags, dressing-cases, &c., are, for neat and clean manipulation, as well as design, really a study for English workmen.

Works in the Precious Metals, Electro-plate, &c.

Influence of Schools of Art—Teaching Drawing, etc.

By FRANK GEORGE JACKSON, *of Birmingham.*

WHATEVER may have been the architectural shortcomings of the structure erected for the Paris Exposition of 1867, there is no doubt they were fully compensated for by the almost perfect arrangements of the interior. The same cannot be said of the Vienna "Weltausstellung" of 1873. Here matters are reversed; the building constructed for the purpose being of great architectural pretensions, while the contents lack that convenient arrangement which should facilitate the work of examination and comparison of the competing exhibits of the various countries now brought together. The peculiar classification adopted, the magnitude of the building, exceeding by about five times the last Paris Exhibition, and the absence of a complete official catalogue, rendered the task of investigation one of considerable labour.

The exhibits of decorative works in the precious metals and electro-plate, are not nearly so numerous as could be wished, or might have been expected, many distinguished names, both English and foreign, being altogether absent from the list of contributors, a fact very much to be regretted; and, as might reasonably be expected, the Austrian display is large, and to a consideration of many of the individual exhibits we will now turn.

Austria.

Amongst other excellent examples of decorative plate shown in this division, the foremost is a centre-piece in oxydised silver, exhibited by J. L. Herrman, of Vienna, of early Gothic design, quadrangular in plan, the elevation of the lower part consisting of four richly decorated gables, in front of which are four groups of figures; above these is another group arranged around an ornamental support, carrying a glass dish for flowers. The subject of the composition is evidently taken from the old and familiar fairy tale of the "Sleeping Beauty," the various groups indicating a state of activity suddenly arrested. The group in front represents the king and queen listening to a song by the court jester, who accompanies himself on a mandolin. The one to the left consists of a man-at-arms and a huntsman restraining the ardour of a hound. The group to the right portrays incidents in the royal kitchen: a stout cook is buffeting a blundering "help," whose fellow is engaged in sacrificing a struggling goose. The fourth illustration shows a fat old cellarman and a jolly friar, enjoying with great glee the sight of a strangely attired dwarf drinking from a huge tankard. The crowning group appears to represent the bower of the princess, and shows the prince about to give the magic kiss. The general aspect of the whole design is at once novel and unique; the figures are spiritedly conceived, and exquisitely modelled, while the careful and distinctive chasing, as seen in the realisation of the various textures, ably supports the efforts of the designer and sculptor. As a piece of art-work, it is unsurpassed in the Exhibition. This firm, in another case, show examples of ordinary electro-plate, which, for style and finish, are very indifferent; the plain surfaces very irregular and wavy, the decoration is mostly effected by flat chasing, the ornamental mass deadened, the ground burnished. This case also contains a toilet set in silver, partly enamelled, including candlesticks and mirror, Renaissance in style, panelled after the manner of the Quattrocento; the supports of the mirror are a little out of keeping, being of a more florid character than the rest of the ornamentation.

V. Mayer und Söhne show a dessert-service in silver, combined with black marble; the effect is good, novel, and a change from the usual glass plateaux; it is designed in the Renaissance style; the modelling throughout is good, and the metal work is executed with exceeding sharpness. The glass dishes used in this service are very lightly and elegantly decorated with engraving. The more ordinary plate is scarcely up to our notions of electro-plate, but nevertheless is the best of its class shown in this Austrian section. The decorative processes employed are etching and engraved outlines filled in by the application of acid; the latter has a pretty silky appearance.

E. Lackner has an extensive show of electro-plate; the plain surfaces are bad, but the decorations are light, elegant, and mostly in the Renaissance style. A mirror, the frame of which was decorated with pierced gilt-work on a silver ground, had an attractive look. Some other articles for the toilette table executed in the same style to match.

Erhard und Söhne.—Their display consists of jewellery, plated and silver work; caskets in oxydised silver, plateaux, photographic frames, and other fancy articles, amongst which I noticed a careful enlargement of a tazza attributed to Cellini. The plain surfaces of the plated ware are bad, the mounts and castings coarsely chased.

H. A. Granichstadten's exhibit consists of silver work mostly oxydised, the ornamental details well pronounced and sharp in execution. The most noticeable feature in this case is the application of niello to the decoration of candelabra; the three articles shown, necessarily simple in form, are Flemish in style, the plain surfaces throughout being decorated with the black tracery in niello; the effect is novel, refined, and well worthy the consideration of metal workers. They also show a toilet set, the principal portion of which is decorated in the same manner.

Conraetz and Reuter show electro-plate metal-mounted glass, and specimens of the incrustation of metals. Here again, like most of the foreign plated work, the plain surfaces are very indifferent and unpleasantly irregular. The decoration, of which there is a profusion, is confined to engine turning, relieving a diaper pattern and a combination of flat chasing and etching upon a ground bright. Two vases of this shape were shown, entirely covered by pierced metal work, the execution being extremely neat. In the specimens of metallic incrustation the ornamental tracery is raised from the ground, and are fine examples of the process.

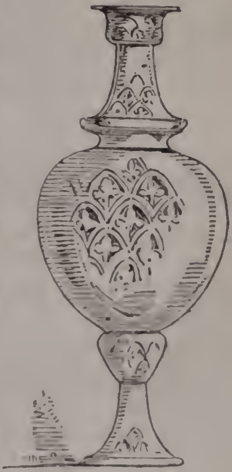


Fig. 18.

Vase covered with pierced metal, by Conraetz and Reuter (Austria).

Ludwig Bohm shows some clever adaptations of arrangements of mechanical objects to the construction of candelabra, candlesticks, &c., produced in a kind of polished black bronze. The compositions, although not in the best taste, are nevertheless examples of ingenuity. There was one candlestick rather novel in form and treatment finished in the same kind of bronze.

D. Hollenbach has a very good display of assiettes montées, centre-pieces, and candelabra, produced in steel bronze judiciously relieved by gilding. They are excellent in design, and are highly decorative.

Joh. Hueber und Söhne, besides an excellent show of jewellery, exhibit a vase in silver in the decorated Gothic style, evidently a special work. It is principally wrought by the hammer. The surface decoration consists of niello tracery. The whole design is of very elegant proportions and a fine specimen of legitimate metal work.

Markowitsch and Scheid have a very striking display of objects decorated with niello, including napkin rings, cigar cases, boxes, &c. They are exceedingly well executed. The ornamentation is neat, elegant, and stylish. I am not aware of this method of decoration being much employed in England; nor can I account for the neglect of so legitimate a process, which has the merit of being effective and at the same time comparatively inexpensive.

The exhibit of *Jgnaz Nowotny* consists mostly of electro-plated table-ware, the decoration of which is by engine-turning of a very elementary character. The manufacture is generally rough and coarse, while the forms lack purity of outline.

Koch and Bergfeld have an important show. In the more decorative pieces the vine is the principal element in the ornamentation. The hollow ware is mostly embellished with engine-turning. In several cases the ornaments are produced by engraved outlines, the mass of the pattern being deadened by the application of acid or other means. This method seems to be very generally used in foreign work; it has a delicate appearance when newly finished, but it is questionable whether it will stand the wear to which articles of utility are necessarily subjected.

Josef Denk has a case of articles in white metal, German silver, and brass polished, consisting of chocolate pots, urns, &c. Surfaces better than those of the electro-plate shown in this section; the forms generally good.

H. Ratzersoorfer shows some good samples of champ levé and painted enamels mostly in the Renaissance style. Leaving the Austrian division, we now enter that of

GERMANY.

Sy and Wagner, of Berlin, first claim our attention, from the extent and quality of their display, consisting of art works, table services, and presentation pieces. The works by this firm are characterised by a severity and sharpness of detail, carried in some cases even to hardness, which renders them distinct from any exhibit of its class. Amongst other special works is a group in oxydised silver, representing the Emperor of Germany surrounded by his generals at Metz, standing upon a silver pedestal of oblong form, on the front of which is a bas-relief, and at each end a figure of Fame holding shields, on which are inscribed victories. Also a shield of circular form, made for General

Werder, commemorative of the Franco-German War. The main part is divided into four compartments containing bas-reliefs illustrating war incidents; the centre is occupied by a symbolic group of eagles in combat, while the ornamental divisions and outer borders are enriched with enamel portraits and heraldic devices; the effect of the latter is not quite satisfactory, as it gives to the work, which is otherwise well executed, what artists would call a "spotty" appearance. In this case is shown a centre-piece in silver of an original form. The model was furnished by the Crown Princess. It consists of a nymph gracefully reclining on a rock which rises from the centre of a group of four shells, the whole resting on an ornamental silver plateau, somewhat after the manner of the subjoined sketch. In another case they show a large and very effective centre-piece. The general form is novel, the details are sharp and clearly defined, even to a fault. A softer treatment in some parts would have added materially to the *tout ensemble.* I noticed that on many works of this firm etching by acid was freely used in the surface decoration where low relief was desired.

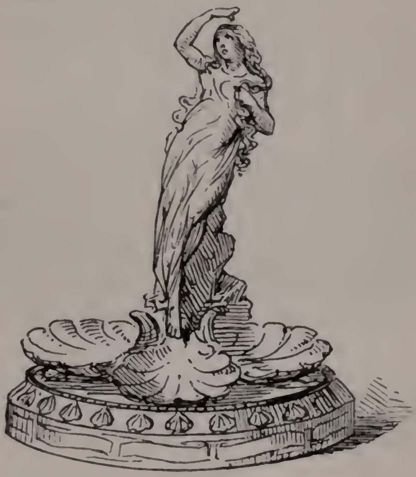


Fig. 19.
Designed and modelled by the Princess Royal of England (Crown Princess of Prussia).

D. Vollgold und Söhne show mostly oxydised silver work, consisting of centre-pieces, compotiers, &c. Amongst others they have a centre-piece of a vase-like form rising from a hollowed base, for the reception of flowers; the modelling throughout is careful and decided, and the general execution good. There is also an enamelled plateau, the general form of which

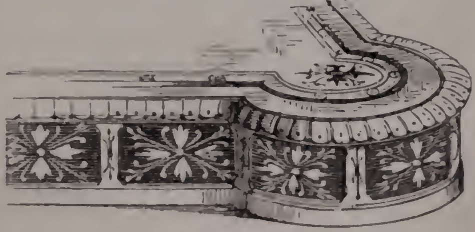


Fig. 20.
Plateau decorated on Looking-glass Surface by D. Vollgold und Sohne (Austria).

will be understood from the sketch of one corner; it consisted of a metal frame-work holding small plaques of blue enamel, shown in sketch by horizontal lines. The glass of the plateau, upon which rests the epergne, &c., is treated in a novel but simple manner, differing from any other similar object in the Exhibition. It is usual in such articles to have the glass plain, the effect being cold and inharmonious; but in this case it is enriched by an ornamental border, produced, on the under side, by engraving, or etching and gilding; by this means the work is not only rendered more ornate but a more harmonious combination of materials is effected.

A. Delihus. Ecclesiastical work, mostly cast, of rather rough execution, consisting of monstrances and chalices. One of the latter, decorated with a kind of filigree ornamentation, had a good effect.

Ravene and Sussmann exhibit some examples of champ levé enamel, and the application of the process to a great variety of objects: pen trays, tazzas, and door furniture; some of the door levers or handles being highly ornate.

There are several other exhibits of plated ware in the Prussian Section, but they are so coarse in design and rough in execution it is not worth while to particularise. Leaving Germany, we now turn to the display of

RUSSIA.

Here we find many excellent exhibits. Amongst those who call for special notice is, first,

A. Potnikoff, who shows some beautiful examples of niello and etching combined, in the decoration of tea sets, small trays, waiters, spoons, and various other articles of utility. The groundwork is sunk by the acid process, and generally gilt, the raised portions finished by niello tracery, presenting a very rich appearance. Some of the borders are after the pattern shown in the annexed sketch, the shaded part sunk and gilt, the tracery generally of an Oriental character in niello; a tankard decorated by the above method being particularly successful. Next come the contributions of

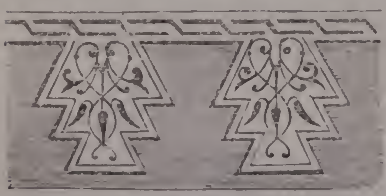


Fig. 21.

Niello Decoration associated with Etching, &c. By A. Potnikoff (Russia).

Owtschinnikow, who, besides many articles in niello, shows a large and effective tankard decorated with "repoussé" work.

The relief is very high, and the manipulation decided, but wanting in softness. At first sight the impression is that it is cast work chased, but an examination proves that such is not the fact. If the relief has not been assisted in the first instance by the use of dies, or similar appliances, it is a master-piece of execution, and shows a thorough knowledge of the capabilities of the material on the part of the producer. So perfect is the groundwork that there is not the slightest indication of pull in the metal, notwithstanding the suddenness of the relief.

Hofliefe Rantsi. P. Klebnikoff has silver work of careful manufacture, chiefly decorated by enamelling, niello, and etching, the application of the two latter methods being very similar to that already described in the other Russian exhibits. The objects consist of cups, cigar-cases, coffee sets, spoons, and albums. A cover for a basin is here shown in the form of a folded serviette, the edge of which is enamelled in imitation of embroidery (after a Persian type). The idea is old, and perhaps is in questionable taste, but the mode in which it is carried out gives it an air of originality, the effect being far from displeasing. The display of *Sasikoff*, consisting of table ware, is not nearly so complete or so interesting as the one of 1867 in Paris. The objects shown, such as tankards, tea sets, spoons, &c., are of neat and careful manufacture, but exhibit no striking feature requiring special remarks.

HOLLAND

Is well represented by *J. M. Van Kempen*, worker in gold and silver. Amongst other important works is shown a large architectural composition, embellished with figures (evidently a presentation piece); it is well modelled throughout, the execution good, but there exists a feeling of want of proportion between the figures and the architectural form on which they rest, detracting from the general effect. A large cup or punch-bowl, made for Prince Hendrick of the Netherlands, is a bold and spirited work; the cup is supported by two eagles effectively modelled; the upper portion of the bowl is decorated with a very graceful frieze of griffins and foliage. Perhaps the most ambitious piece in this case is a large vase illustrating slave emancipation. On the summit of the vase is a figure of liberty, and on each side groups contrasting slavery and freedom. The style of the piece is Louis XIV.

Bonebakker shows tea services, &c., mostly plain. The surfaces are fair, much better than the generality of foreign work. Style of ornamentation is Louis XV. A carefully modelled figure of "St. Cecilia," after Raphael, is shown by this exhibitor.

DENMARK.

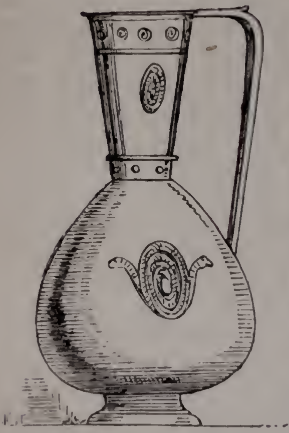


Fig. 22.
Claret Jug, by V. Christesen (Denmark).

The principal exhibitor is *V. Christesen.* He shows a large centre-piece in oxydised silver, scarcely worthy of this celebrated house. The specimens of ordinary plate and silver work are not numerous, but most of those exhibited are good in form, have an excellent surface, are well made, and very tastefully decorated. The style of ornamentation generally adopted is Scandinavian; in some cases the patterns are raised in imitation of filigree, as in the claret jug here given; besides the plate work a good collection of filigree jewellery in the same archaic style is exhibited.

NORWAY.

J. Tostrup exhibits a quantity of silver work, consisting of filigree jewellery, and the application of filigree and rolled wire in imitation thereof to the embellishment of large works for

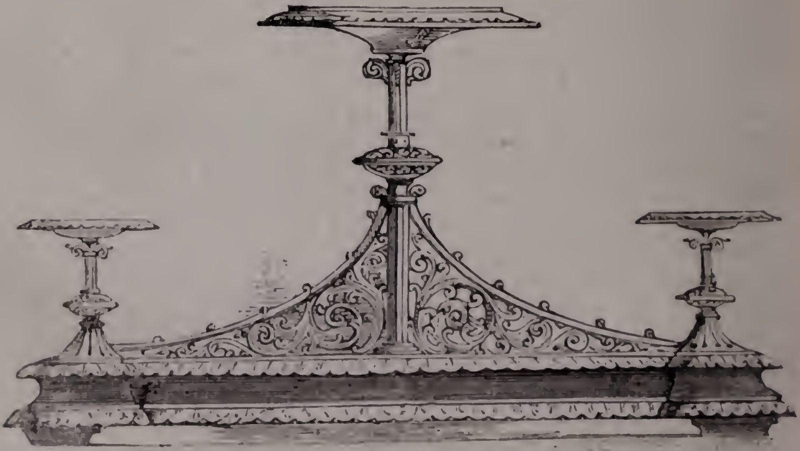


Fig. 23.
Epergne, in which filling up with Filigree is introduced, by J. Tostrup (Norway).

table decoration and other purposes. There are several chalices ornamented in this manner with good effect; but by far the most important piece shown is an epergne, striking from its simple construction, and the application of filigree, &c. The sketch (Fig. 23) will convey some idea of the general character of the work. The part darkly shaded represents the black wood base, the ornamentation on which consists of the rolled wire similar to that used by jewellers, which the French call "galleries."

SPAIN

Shows some few specimens of silver and plated ware, but they are rough in execution, and without any merit in design, mostly "rococo" and feeble moresque; the only exception being in the case of an ewer and basin.

Placido Zuloaga has a case containing a very beautiful collection of articles in iron and bronze, damascened with gold and silver, and some fine examples of carving in steel, consisting of shields, daggers, vases, caskets; and one vase, somewhat of this form, besides being richly damascened, had in the centre a piece of bright steel carved and pierced, laid over a gold ground; the effect of the contrast thus afforded between the brilliancy of the steel and the rich sober tone of the rest of the decoration is excellent, and worthy of special praise. The style of ornamentation adopted in most of the works is the moresque. The method that seems to be adopted here is this: the patterns being decided upon, the parts of the article to be decorated, which are to receive the gold, are roughened with sharp file-like cuts, the gold is then applied and made to adhere by pressure. The whole is then finished by chasing, adding to the larger masses of the ornamentation any requisite details. It differs in appearance from Oriental work, the ornaments being in greater relief. A variety of this method is sometimes practised: when the pattern consists of fine tracery, it is effected by pricking the outline with a sharp pointed tool, raising teeth like projections, and applying the gold threads by force.

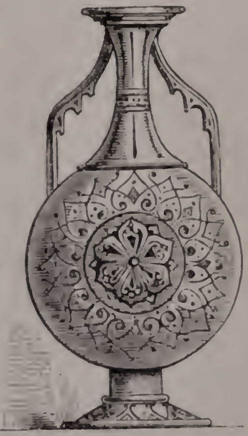


Fig. 24.

Vase executed in Steel, repousséd (beaten), chiselled, and damascened with Gold, by Placido Zuloaga (Spain).

FRANCE.

Christofle et Cie. have a very varied display, comprising electro-plate, silver work, enamels, and metallic incrustations. The quality of the former is not what might be expected from so famous a house; the plain surfaces are very indifferent, due, I presume, to the use of a comparatively soft metallic base, and the process of spinning instead of stamping or raising with the hammer. The cast mounts are heavy, and in some cases altogether disproportionate to the objects to which they are applied; but as regards surface decoration much ingenuity and taste is brought to bear. Many of the designs are etched with great effect in mass and line; others are chased in outline, and "matted;" while again the combination of engine-turning and engraving is thoroughly well developed. On a tea service I noticed a peculiar treatment, apparently produced by etching the whole body of the article, with the exception of some narrow bands, being semi-deadened, and afterwards re-etched. The texture being something like leather, the effect is novel, but it seems to convey an idea of thickness and weight. Some of the etched decorations have gilt grounds. Turning now to the more decorative works in cloisonné enamels, &c., the display is charming, and shows a wonderful advance since the last Paris Exposition. The enamels are exquisite in form and decoration, based for the most part upon Oriental types, but not slavishly copied—not mere reproductions, but fruits of an intelligent study of recognised authorities in this truly beautiful and ancient art. Amongst the many examples shown, some are of large size. One vase is made in sections, and connected together with metal mounts. One example of a bowl-shape, holding a glass dish, struck me as being very successful; the ground was black mottled with red, relieving a pattern based upon the common dandelion. A large mirror, the frame of which was in enamel, had a quaint and original appearance, interesting as showing the variety of purposes to which this kind of decoration can be applied. Great as the advance is which has been made in enamels, it is quite equalled, if not surpassed, by the development of the process of inlaying metals. To this latter mode of decoration Messrs. Christofle have paid great attention for a considerable time, the particular *modus operandi* being peculiar to themselves. The process consists of sinking, by engraving or other means, the required pattern on the surface of the selected article, and filling in the cavities with silver or gold, as the case may be, by means of the electric deposition process; any excess of metal being cleared away, and the pattern brought flush with the surface. It is in this latter particular that the process is distinguished from that generally known as "damascening," which is more or less raised from the ground. A great number of the works shown consisted of bronze vases, decorated with gold and silver, are large and important. The designs of many of these have a Japanese motive, and are singularly well adapted to the expression of this kind of embellishment.

In the truly glorious display of *F. Barbedienne*, many objects coming within the province of this paper were to be seen, the most striking of which were two vases in cloisonné enamel, five feet in height, the most perfect of their kind I have ever seen. Although they are not the production of the house, but the work of Japanese artists, they nevertheless testify to the taste and love of art which seem to animate the direction of this house of art manufacture *par excellence*. An octagonal table, with a star-like arrangement in its designs, having a white ground and blue ornaments, and executed in cloisonné enamel, evidently Chinese, is exceedingly effective. He also exhibits a pair of vases, in champ levé enamel, in developing which process he has achieved a considerable reputation. The vases in question are made in four distinct pieces, and skilfully united by metal mounts. The design is rather Persian in feeling, the colouring harmonious and effective. A large corbeille in silver, for table decoration, modelled and pierced, showing a dark blue glass lining, is a good example of composition in the style of Louis XIV. The best example of silver work shown by this exhibitor is to be found in a pair of candelabra in the same style, elaborate in detail almost to an extreme; the chasing is simply exquisite. Two candlesticks are exhibited, in which a combination of metals has been employed; the style here adopted is that known as "Neo Grec." The pillar consists of a square shaft of copper richly incrusted with silver, supported by griffin feet, also in silver. From the silver capital, composed of masks, rises the nozzle made of copper, incrusted like the pillar, and supporting a large glass nozzle pan. They are exceedingly decorative, and afford a good lesson in Industrial Art.

Among the display of bronzes by *G. Servanti*, some very good examples of champ levé enamels, mostly confined to small vases and tazzas, are exhibited.

A. Bertrand has a fine collection of art works in galvanoplastic, consisting chiefly of the reproduction of ancient objects finished in oxydised silver. He shows also a large number of caskets of modern design, finished in the same manner.

ENGLAND

Is nominally represented by some half dozen firms, but practically by about half that number. First in importance comes the display of *Messrs. Elkington and Co.*, the comprehensiveness of which is unsurpassed in the Exhibition. The variety in their exhibit is remarkable, ranging from ordinary electro-plate for daily use up to works of the most ornate character. The decorative processes employed are numerous, in addition to the more ordinary ones of flat-chasing, embossing, and engraving; they include niello, etching, damascening, incrustation of metals, enamelling (cloisonné, champ levé, and painted), repoussé in iron and silver, and parcel gilding. As the original patentees of the electro-plate, they are still the leading producers of this kind of ware; English thoroughness is noticeable in all their ordinary productions, perfect uniformity of surface, indicating the quality of material, and the care taken in the manipulative processes. The decoration of articles made from sheet metal, such as tea sets, dishes, &c., is confined principally to engraving, embossing, chasing, and the application of ornamentally rolled wire; many examples of the latter legitimate mode of decorating utilities are shown, the ornaments are in low relief, and have a delicate appearance. I append a water jug as an illustration; the embellishment is here restricted to the use of the wire in question, while the surface of the plain parts is such that it is doubtful if the addition of engraving would at all improve its appearance. A dessert service in silver is particularly striking from the novelty of the decoration by enamel, and the simple elegance of its outline, designed after the best period of Pompeian Art.

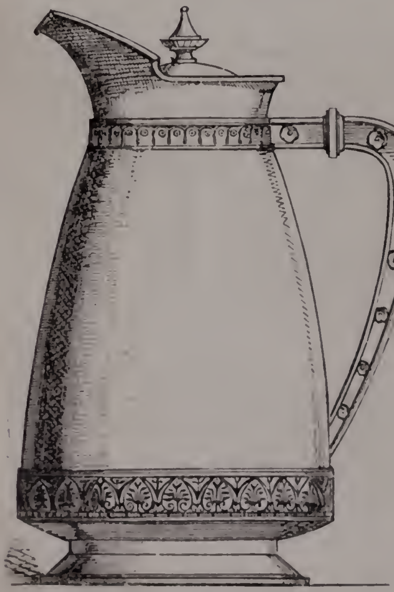


Fig. 25.
Water Jug, by Elkington.

The more decorative works by this firm are numerous. The "Helicon Vase" is a triumph of industrial art, executed in repoussé silver and steel damascened with gold, and consists of an elongated plateau decorated with silver bas-reliefs. From its centre rises a vase of oval form, introduced on which are bas-reliefs representing the Muses, surmounted by a group of boys holding the lyre of Apollo. At the foot of the vase are seated two charming allegorical figures of Music and Poetry, with their attendant genii. The conception of the whole work is exceedingly graceful, the manipulation brilliant and free, while the delicately-wrought details bear testimony to the artist's thorough mastery of the peculiarities and capabilities of the materials with which he had to deal. There is also the now well-known International Volunteer Challenge Trophy in oxydised silver, a bold sculptural work allegorically representing Peace and War. Another important work, commemorative of the Abyssinian campaign, is a very spirited composition; the general form partakes of the pyramidal, and comprises a large silver pedestal on which is introduced illustrations of incidents connected with the expedition; it is flanked on each side by lions; this rests upon a decorated ebony plinth, the whole supporting a finely modelled group representing Victory standing over the prostrate form of King Theodore. Besides the larger works just enumerated, they have many minor pieces of rare excellence. Two small tazzas are executed in repoussé and damascened with gold. A small vase in oxydised silver, illustrative of the history of inventions, and some claret jugs of classic form, may be mentioned. I subjoin a sketch of one of the jugs. A vase and dish is a fine and brilliant work. An exquisite, although smaller work, is seen in the form of a silver casket, decorated in the Italian Renaissance style, by the much neglected niello process, and parcel gilding; the ornamentation is of a very elaborate character, the sides and cover panelled and filled in with grotesque animals, and foliage here and there relieved with gold tracery. The top of the casket is surmounted by a small and finely modelled group of satyrs. The whole work is novel in effect; it calls for special notice, not only on account of the merit of the design, but also from its indicating the desire of this firm to

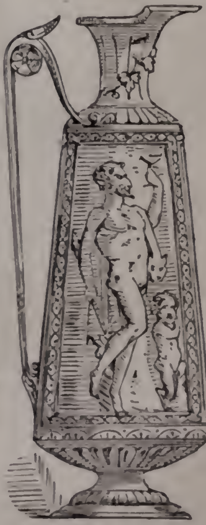


Fig. 26.
Claret Jug, by Elkington and Co.

introduce this truly artistic process. The process may be thus described:—After the design is completed, the parts requiring to be incrusted with niello are sunk either by engraving or etching with acid, the cavities are then filled with niello (a black compound of silver, copper, lead, and sulphur), and fused by heat after the manner of enamelling. The superfluous niello is then cleared away and polished to an even surface. It is superior to enamel from its toughness, but, unlike enamel, it is limited to one colour only, i.e. black.

Among the many specimens of Messrs. Elkingtons' metallic deposition, their "Alhambra Table" is a prominent example, an adaptation of architectural details, taken direct from the palace of Granada, and applied to the purposes of decorative furniture. The table part partakes of the character of a sideboard, upon which rests a mirror with frame in the same style. Perhaps the greatest success this firm has achieved in connection with electro-metallurgy, is in the production of bronze statuary. Several examples are shown in Burke and Goldsmith, after the original models by J. H. Foley, R.A., and Hercules Overcoming the Œnonian Stag, after an antique group found at Herculaneum. They also apply this process very largely to the reproduction of copies of antique plate armours, &c., rendering with fidelity the beauties and peculiarities of the originals. The next important feature in this display is the collection of enamel. In 1862 this firm had practised the process of champ levé with considerable success, applying it to various objects, and modifying the process as occasion required. Many of the examples now exhibited are evidences of the energy brought to bear upon this branch of manufacture. Amongst the number an ice pail or bucket, decorated with flowers, illustrations of the seasons, and light scroll work; it is divided into four compartments by an ornamental Caryatis. The colours are brilliant and harmonious. A jug and dish, in the Persian style, are also exceedingly meritorious works. Another and more important work is to be found in their chess table, executed principally in champ levé and painted enamel; the ornamental portions and the chessmen in the former, and the finely executed portraits of celebrated chess players, with which the table is embellished, in the latter. Not content with the success achieved in the champ levé method, this firm has now taken up the more difficult, but at the same time more artistic, process of cloisonné enamel. One piece, in imitation of the Japanese "cloisonné" style of design, is a capital realisation of the peculiarities of Oriental manipulation; the technical quality of the enamel is perfect. Amongst the examples of original designs there is a large tazza, fourteen inches in diameter, the concave portion of which is covered with a decoration illustrative of St. George Overcoming the Dragon; round the edge there is introduced a border of roses symbolical of England. To those who are acquainted with the difficulties to be encountered in carrying out such a design in cloisonné enamel, the result is very gratifying. The *modus operandi* by which this example was produced, is as follows:—First, a finished design is made, showing the proper colours to be employed; a careful tracing of it is then prepared for the artist-workman, to guide him in bending the strips of flat wire, which vary in thickness according to the requirements of the design. The outline of the whole composition is then minutely traced upon the dish, and the bent wire placed edgeways thereon and soldered to the metal of which the object to be decorated is formed. The colours are then introduced into the cells thus formed in a kind of paste and subjected to a great heat until they are perfectly fused; it is then allowed to cool. The process is repeated until the whole of the cells are quite filled. Finally, the superfluous enamel is ground away and the dish is polished. The champ levé differs from the above in that the cells are *cut or carved out* instead of being formed by *partitions laid in*, this is done generally upon a "pattern," and copies reproduced by casting, or by electro-deposition; the manipulation of the colours is effected in a similar manner to that used in the cloisonné. It will be seen from this that the filigree or partition method (i.e. cloisonné), as it is sometimes called, is by far the most ingenious and most artistic of the two methods, as requiring greater care and patience on the part of the producer. Before closing these remarks it may be as well to state that of the champ levé varieties the enamelling on deposited metal is the most difficult, from the peculiar character of its texture. The advantages to be derived from this mode of reproduction (i.e. by electro-deposition) being fully appreciated by the firm, led them to combat the difficulties they at first encountered; the result has justified their endeavours, and hence enamelling upon deposited metal has become with them a speciality. The chess table before alluded to (i.e. the Alhambric) is a notable example of its application, and demonstrates the success of the experiment.

Hancocks and Co. have an excellent and varied show, consisting of electro-plate, silver work, and jewellery. Their ordinary plate is good in surface and simple in decoration. Some specimens in which the surfaces were semi-deadened—in one or cases relieved by gilding, without engraving or chasing—had a pleasant effect. I am told that it wears well, no rubbing being required, as it is only necessary to clean them with water. They show some good examples of table glass, mounted with metal, lightly and neatly executed. A tea and coffee service decorated with bright gilt-metal ornaments modelled and pierced, had a rich effect. The large decorated works are numerous, massive in style, and thorough in execution, distinct in character from most of the German and French works in this class, not partaking of the hardness of the former nor the light playfulness of the latter; there is (if I may so express myself) a certain solid gravity and look of earnestness about them. It may be some would prefer more brilliancy in the modelling; but for my own part, if this were added at the expense of some of the sterner merits of the works, I should much prefer to take them as they are. For example, examine their now celebrated "Tennyson Vase," and compare it with any French work of a similar kind, although it may appear somewhat dull by contrast, yet, judging both by the higher qualities of vigorous drawing and thoroughness of modelling, it will be found more than equal to the test. Many of their race cups are spirited in design; one designed for the Brighton Races is very appropriate in form (I give rough sketch of its general shape). Near to this case is the exhibit of

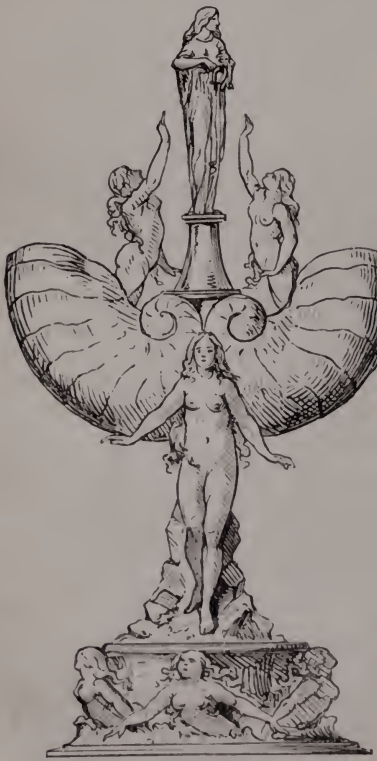


Fig. 27.

Race Cup, by Hancocks and Co., London.

Shaw and Fisher, consisting of ordinary table ware in electro-plate and Britannia metal, the former of a much coarser kind than shown by some of the other English houses. Much of the ornamentation is produced by the press in imitation of engraving; it is a cheap method of decorating, but the degree to which it is apt to "pucker" the metal renders it unfit for the decoration of any but the cheapest kind of ware. Some of the better articles were chased and deadened similar to some already noticed in the exhibit of Messrs. Christofle in the French Section.

Benham and Son, amongst other articles, show some electro-plate of good quality, comprising tea services, claret jugs, biscuit boxes. One of the latter had a pretty and simple decoration—an imitation of filigree on a gold ground. They show also some toast racks, composed of cricket-bats, rifles, &c., very ingeniously arranged; designed, I presume, to suit the taste of those who are prepared to sacrifice the canons of art so that they get a "novelty."

INDIA,

Although not showing anything analogous to our electro-plate, yet exhibits a variety of articles in metal and other materials. The forms, generally traditional, have a degree of elegance and simplicity which gives them great educational value. The vice of novelty-seeking has not yet vitiated the manufactures of this country. It is interesting to note that when a form has once been recognised as perfectly answering its special purpose, it is

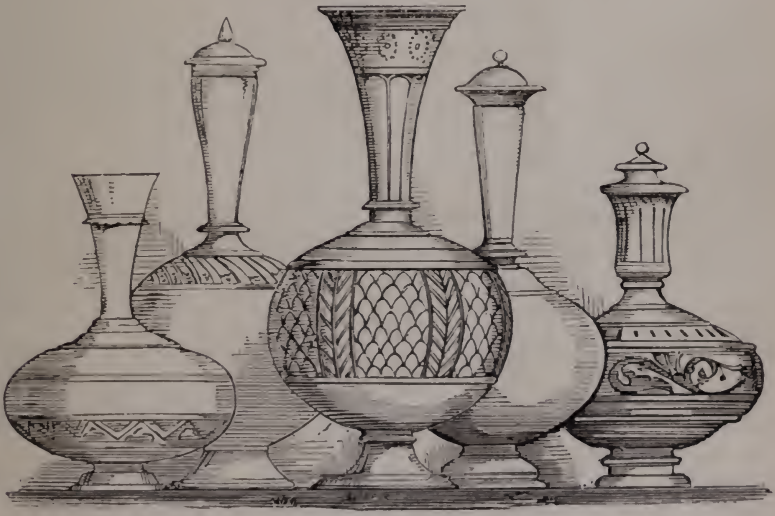


Fig. 28.
Group of Goglets or Water Bottles (from Indian Court) in Metal inlaid with Silver i.e. Bidery Ware.

not from a mere freak of fashion, as with us—who profess to believe that "a thing of beauty is a joy for ever," thrown altogether on one side, in order to take up, for its own sake, some uncomfortable novelty; on the contrary, with true art-wisdom the natural desire for wholesome variety is met by adding to old forms new graces and varying proportions. As an example, examine the objects given in the sketch, Fig. 28. Here we have the same bottle form running through the whole—they are like, but yet unlike.

REMARKS.

After a careful examination of the various exhibits brought together in the present Exhibition, I find myself led to endorse the opinions freely expressed in many quarters as to the undoubted superiority of English manufacture of utilities, both as regards material and workmanship. With regard to electro-plate, its pre-eminence is due in the first instance to the superiority of the metallic base employed, which, while it is susceptible of a higher finish, and engenders a more careful manipulation, is at the same time of a more durable character than that employed by Continental manufacturers generally. The care bestowed upon the foundation, if I may use the expression, is peculiar to British industry, and is the distinguishing feature from most of the foreign work. While with us, durability, evenness of surface, and solid workmanship are the chief considerations, the manufacturers of other countries seem to concentrate their attention upon ornamental construction and decoration, which is often carried to excess. Utilities as a rule do not require a great amount of ornament or complicated embellishment: to forms well chosen for their fitness (for special purposes) should be added simple ornamentations, while the construction arising out of necessity should be light, consistent with perfect durability. It is a curious fact that these conditions are mostly ignored by those countries who have a high reputation for the production of decorative works; this, I apprehend, arises from their regarding an article of utility as an object for the display of art, and, by making this their prime consideration, losing sight of the necessities of the case and the purpose which the article has to serve. Setting aside for a moment the redundancy of decoration observable in French, German, and other foreign work, it must be owned that they exhibit more ingenuity and employ more processes in their ornamentations than we do. While, altogether, they have very much to learn from us in the way of manufacture, we can yet "take lessons" from them in matters pertaining to means and methods of ornamentation and embellishment. If to Great Britain belongs the palm for the solid manufacture of articles for daily use, to France is due the wreath as the producer of decorative works. In comparing the mass of exhibits in the French Section with those of other countries, one cannot fail to be struck with their superior artistic character—notwithstanding the individual works of unsurpassed excellence to be found among the exhibits of other nations, many of which it must be confessed, if not produced by French artists, owe much to French influence. Their works generally have a warmth and a brilliancy which betoken a natural love for and a devotion to art, an unquestionable characteristic of the French as a nation.

THE INFLUENCE OF SCHOOLS OF ART—METHODS OF TEACHING DRAWING, ETC.

In decorative works England has made great progress since the last International Exhibition in 1867, and the energy with which many processes have been taken up and developed raises strong hopes that we are becoming more artistic in our aspirations, and that our latent love of art is at last manifesting itself. The improvement is due in some few cases to the employment of French artists, but there are notable instances in which it is owing to the activity and the fostering of native talent. That we are stirring in these matters of higher industrial art is evident for many reasons, amongst them the increase of our schools of art throughout the kingdom, and the strong desire for a knowledge of drawing shown by the middle classes as well as artisans. As in decorative manufacture we have somewhat to learn, so have we much to acquire in devising a practical system of art instruction that may bring about the end we desire. Our present system of art instruction I believe to be defective; our schools are too much devoted to the *making of drawings*, rather than producing *draughtsmen;* too much time is spent upon mere manipulation at the expense of higher matters—neatness of line is insisted upon while the form of which it is the boundary is neglected. I am the more impressed with this view from having examined the course of study adopted by the Ecole Municipale de la Ville de Paris, and exhibited in the Weltausstellung of Vienna, and comparing it with a similar exhibition of school works at South Kensington, London: the leading characteristics of the French drawings is *realisation of form*—that of the English, *neat manipulation*. That I am not single in my opinion as to the latter, I will quote from the "Report on the National

Competition of the Works of Schools of Art," just issued from South Kensington. Speaking of certain defects observed in the figure drawings, the reporter states that some of them "showed the danger of losing the general expression of the figure by attention *to too minute* a mode of execution." What is here said of figure drawing, might be well applied to the other more elementary stages. It is in the earlier stages of instruction that the error which permeates our system commences: too much encouragement is given to laborious manipulation of outlines—retouching and mending for the purpose of obtaining pureness of outline—a lifeless copying of outline rather than the spirited realisation of form—a timid anxiety for neatness of execution in *each* of the few attempts the student is enabled to make, rather than by *oft-repeated* essays to realise form, leaving execution to come as knowledge increases. Who would think of teaching writing upon the same principle as drawing is generally taught? No one would dream of touching and patching up each "copy." On the contrary, the student's success rests upon *repeated* efforts, and not upon the trimming up of a *few*. The method of teaching drawing might be assimilated to that pursued in teaching caligraphy with very great advantage. The effect of the errors just pointed out is painfully apparent in the higher branches of art, particularly in design. The previous training of the student renders him unfit to grasp a *tout ensemble* ; and instead of first considering the general effect and the leading lines of his composition, he loses himself in a mass of little details which have little or no connection with each other.

It is to be regretted that there are but slender hopes that the defects in our system will be remedied while the method of payment on results (a principle good enough in theory, but somehow often bad in working) is in operation, as it tends to give permanency to the error by encouraging the production of works for *show*, the preparation of which is at the expense of the student's best interest, and an amount of feeble instead of vigorous drawing is thereby generated. What is required is more time drawing and more sketching from memory.

In all competitions in the higher branches of study, students should be required to send in time sketches duly authenticated along with their more elaborate drawings, the two works to be judged together. Whatever may be done in the way of reforming our method of art instruction, let us hope that it will lead us from the idea, that the sole aim of a school of art is to produce a number of neat and respectable drawings, and direct us to the truer one of developing *real art* power amongst the masses of the people.

Design as applied to Jewellery,

Real and Imitation; also to Trinkets in Glass, Iron, &c.

By J. WILLIAM TONKS, *Birmingham.*

AFTER a first walk through this vast assemblage of industrial products I felt that it was only by the close, and, indeed, by the exclusive study of one subject at a time, that any real good was to be gained from visiting it. The space covered is so enormous, the materials occupying that space are so diverse, that any attempt at a general review would lead to confusion in the mind and would be useless for all practical purposes. I soon became convinced that my only chance of obtaining any benefit from my successive visits was to mark out a definite line of study and rigidly adhere to it, closing my eyes, as it were, to everything else. This apparently narrow policy was difficult, and at first distasteful, but I soon had good reason to rejoice that I had acted upon it. As, then, I found it so useful to myself in visiting the Exhibition, I shall endeavour, without further explanation or any apology, to pursue a similar course in reporting upon what I have seen, in the hope that by so doing I may be of some small service to others.

It would naturally be expected that the Germans, being near home, would be most fully represented in this Exhibition, particularly in the jewellery department, but few would be prepared to see how little many of the other great manufacturing nations have contributed in this direction. The French jewellery comes next in point of number and importance, but in quality appears lamentably below the standard which fashion and tradition have assigned it. English jewellers are, with a few notable exceptions, unrepresented; while the Birmingham manufacturer of trinkets and imitations, whose wares find their way to every market, is here not to be found. Italy is better represented; but Switzerland has only one case of jewellery proper, and Spain one, in which the work of the goldsmith is a subordinate feature. Russia has about two cases proper; Denmark two; both of these, however, containing the work of one manufacturer; while all I can say as to the steel brooches and earrings of Belgium is that if they were there I was unable to discover their hiding-place. This most unequal representation of the industries of different countries places a reporter under a serious disadvantage. In so far as he reports with fidelity upon what he sees, in so far is he liable to misrepresent great industries which are inadequately represented in the Exhibition. I must therefore premise that, in offering opinions and in drawing conclusions as to the applied design exhibited in the jewellery of different nations, I simply speak of what I have seen, and cannot hold myself responsible for these opinions as if they were matured conclusions upon the designing power of the nations themselves.

As the German display of gold and other jewellery is by far the largest, it will be well to speak of it first. A careful survey of these productions, and a general comparison with those of other nations, leads to the opinion that the manufacturers are fully alive to the importance of design and earnest in their efforts to cultivate it. There is a freshness and novelty in their forms, a departure from old methods of arrangement in their best examples, which continually suggests this. This was, however, often so random and irregular in the specimens exhibited, I began to wonder whether the ideas carried out were the result of study and careful attention to design, or freaks of fancy rejoicing in that supposed blissful ignorance which knows no rules of art. I had an opportunity of deciding this moot point on my return from Vienna, and as it now comes in the way of my subject I will venture to refer to it here. Hanau and Pforzheim are the two great centres of the jewellery trade of Germany, and in the former of these I was enabled to visit a large manufactory where gems were chiefly mounted in silver or in gold of eighteen-carat quality. I found there a professional designer sitting in a sort of glass case at one end of the principal shop. It was his business to prepare designs for the mounting of a number of gems from time to time entrusted to him, and to arrange such gems harmoniously. Further, in order to ensure that the lines of the intended ornaments should be pure in form and correct in style, I noticed that he was accustomed to shape or turn up with pliers the pieces of gold which were to be their frames or boundaries. This shop was full of young people, there being four or five to each adult, a prevailing fault, as I afterwards found, in the shops of German goldsmiths; but nevertheless these young people were so far educated that nearly all those who had attained the age of seventeen had placed before them one or more of the designs referred to, which they were engaged in working out.

So much for German efforts in design. Now as to the general success of such efforts. They are often crude, they are more frequently flighty, but, as I have already shown, they are genuine, steady, and continuous efforts. When the designer limits himself by strict rules of art he often produces very beautiful effects, and when he goes beyond them he often surprises by the novelty of his combinations. He generally finds the path too narrow for him; his roving fancy leads him to astonish the mind by some strange expedient, or some novel application of an idea. If the centre of a brooch is not attractive enough when at rest he introduces an arrangement at the back, so that it may slowly revolve and dazzle the eyes. An earring is usually a drop hanging lightly by means of a thin wire; but the warlike imagination of our German designer gives us a sword with jewelled handle apparently thrust through the lobe of a lady's ear. A cameo pendant and earrings are quite removed from the common-place when the cameos are set in diamond triangles and surmounted by palm-trees. As this design is a typical one and is exceedingly well carried out, I have added a sketch of it as correctly as I can give it from memory. (Fig. 29.) The set is in the case of Mr. Hartung, of Vienna.

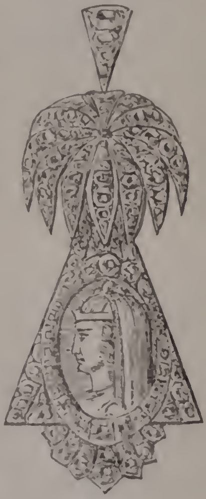


Fig. 29

Amid many excellences the besetting evil of German jewellery is its incongruity with itself, and with the use it is intended to serve. In this they may not be worse than other nations, but as the cases of these makers exhibit the fact more palpably than any others except the French, I am bound to refer to it here. To illustrate my meaning, I will take the case of a brooch, and compare the modern German one with the ancient article which fulfilled a similar purpose. The old Franks and Goths regarded the brooch as a means of attaching firmly together upon the breast, parts of the dress or mantle which must otherwise fly open to the wind. They therefore made it a strong serviceable ornament, often partaking somewhat of the character of a buckle fastening, so as to convey more plainly the idea of holding together the dress it was intended to fasten. Specimens of such brooches are to be found in most of the museums in the larger

German towns. They are not sufficiently studied; for the modern German brooch is too often a flimsy gim-crack article, the centre being occupied by an assemblage of small claws or open settings, containing gems, with a slight framework round it, over which diamond or other sprays are flying, and a number of drops dangling loosely at the bottom, as indicated in Fig. 30. These claws, drops, and spray ornaments are often produced by machinery, so that the art of the designer here consists simply in scattering them about the article in diverse positions. The brooch completed may look, as some ladies would say, very light and pretty; in fact it appears so fragile that the very idea of a brooch as an article of use is lost, and that of a mere ornament takes its place.

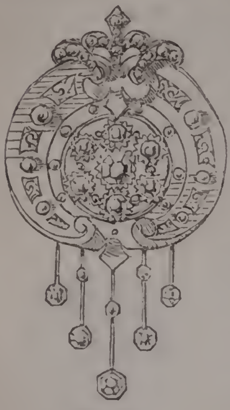


Fig. 30.

In order further to carry out his constant yearning for variety of surface and diversity of colour, the German manufacturer has adopted a peculiarity which he probably borrowed from the French, although he has himself much developed it. This is the custom of burnishing the rims, borders, and other parts of gold decoration, bringing out by contrast the coppery tint of the alloy against the dead coloured gold surface. These surfaces are occasionally still more varied in colour or heightened in effect, particularly in the case of châtelaines, by the introduction of tubes or bars of platinum. These violent contrasts, though highly prized on the Continent, are repugnant to English taste, as approaching too nearly the garish imitations in gilt and plated work for which, I must add, some British manufacturers are pre-eminent.

Another direction of German effort at novelty, if not at design, is somewhat allied to the preceding, and deserves mention for its daring violation of the recognised laws of Art. Having mentioned the alloy in gold, I must explain that by mixing similar quantities of pure gold with various metals in different proportions, a number of colours of alloyed gold may be produced. This was well known and extensively practised in Birmingham some thirty years ago, chiefly in the manufacture of small articles, such as scarf pins and earrings. The very liking for such things has long disappeared in England; but as a departed fashion certainly revives, either in a new place or under a new aspect, so this feature has been revived on a large scale. The German exhibits at Vienna include a considerable number of brooches, earrings, &c., of a merely imitative character, and remarkable only for the success with which the various alloys of gold are adapted to express the colours of leaves and the petals of flowers. They consist often of the wild rose bloom, or other wild flower of simplest form, with a few leaves round it; but the merit of the effect is in some instances so great that the flowers appear to be of several colours which melt into each other like rainbow tints. Still the mere imitation of a natural object in an article intended for some definite use is always objectionable, and this becomes more apparent when such an article is manufactured for the purpose of fastening a dress, or clasping a lady's arm. In spite, however, of its many exaggerations, and frequent incongruities, the German display of goldsmiths' work at the Vienna Exhibition is a refreshing one. It not seldom betrays an undue straining after novelty, overshoots the mark, abounds in imitations of objects natural and artificial; it is redolent in bracelets loaded with every conceivable arrangement of straps, buckles, palisades, and plaited work; and it is replete with examples of that everlasting true-lover's knot, which seems specially created to fill up every vacant space in a gold ornament, for it is stuck into every corner in any such article without distinction, either plain or set indifferently with any kind of stone. But, admitting all this, the German goldsmiths' work as a whole is more ingenious, more fertile in contrivance, and shows more energetic striving after good design than the displays of most other countries. Its best examples are simple, based on geometric forms, and massive in character, approaching the English ideal. The finish of the work is not, in my opinion, so good as that of the very finest English work, but is on the average better than the average finish in England.

Having referred to the general design and character of German goldsmiths' work, strictly as such, for the sake of distinction, it now remains to say a few words on its jewellery proper—the arrangement and setting of gems. There are two distinct theories upon which an article of ornament containing gems may be constructed, and it is according as we lean to one or other of these theories that we shall approve or disapprove of any such article when finished. The learned professor and the connoisseur in Art, regarding an article of jewellery as complete in itself, irrespective of the uses it is intended to serve, or the colours with which it is to be worn, lay down the dictum that if such an article is, in form and colour, harmonious with itself, it must be considered a perfect work. This is one theory. But social custom, and what we may call the best English taste, has, in effect, laid down another law of a directly opposite character. By this unwritten, but no less powerful regulation, the English designer is forced to regard an article of jewellery not as a thing complete in itself, required only to harmonise with itself in form and colour, but as a part of the dress of the lady or gentleman for whom it is intended. These diverse theories naturally produce very different and important results. The Continental jeweller, as a rule, goes upon the first of these theories, thinks only of the harmony of the jewel with itself, and therefore does not scruple to introduce in one article gems of different contrasting colours. Thus rubies, emeralds, and even turquoises, may be found in one ornament; garnets and turquoises in another; diamonds, rubies, and sapphires in a third; and so on. These are usually so harmonised that the effect of the whole is pleasing; but it is obvious that the effect of such a jewel is less powerful when the dress it is worn upon possesses any decided colour, and its lustre may even be quenched for a time by the beauty of a highly-coloured silk, or the brilliancy of a bold fringe or trimming. The disadvantage also of such an ornament further consists in this, that as it is already harmonised with itself, any colour prominent in the dress it is worn upon necessarily overbalances the harmony, and throws the jewel, as it were, out of tune.

The English designer for fashionable jewellery must take a different course. Custom demands that he shall introduce into one jewel only one powerful colour, trusting to the good taste of the wearer to display it only upon a dress which will harmonise with it, and will more powerfully assist it by contrast. If a sapphire, he may employ diamonds, but never emeralds or rubies. If turquoises, he may accompany them with pearls or diamonds, but never with coral. This fact is eloquently brought out in the exhibits of Messrs. Hancocks, of London, upon whose display in the Vienna Exhibition the reputation of British jewellery there mainly depends. In their cases may be studied the complete carrying out of the principle just advanced, and it remains for the observant public to say which of the two theories is correct.

The numerous varieties of gem-setting for which Austria is chiefly known, are included in the class which embodies the theory of several colours in each jewel. To illustrate the way in which a large section of this work is done, and the mode of design often pursued, let us take the case of a pendant. We will suppose the most frequent centre, an enamel painting, or a large turquoise shaped as shown in Fig. 31. Around this centre the artist arranges a border of pearls. A little more colour is required, so he decides to indulge in a following border of rubies. Next a row of turquoises may be allowed to tone down the effect ; and as the design is becoming nearly the size it is intended to be when finished, the outer shape must now be decided on. This may take the form of eight curves or scallops, in the centre part of each of which a ruby may be very likely inserted. Round each of these, following the shape of the scallop or shell-curve, a row of pearls may ensue ; eight turqoises set in the corners outside between the scallops, and the jewel is completed by a drop and a loop in same style. It is not well finished at the back, the setting is not good ; it is not English taste ; but it may be defended on the same ground that a Mosaic floor may be defended. If it be true that a jewel ought to have only one prominent colour, and that it should trust to the dress of the wearer to harmonise it, then the whole thing becomes a mistake.

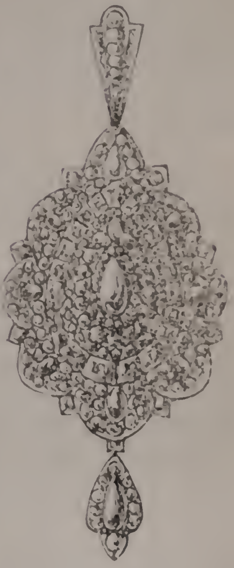


Fig. 31.

While speaking of the arrangement of colours in German jewellery, one word must be said as to the sorting or matching of gems of each kind, for setting in one and the same jewel. The fact I have to notice is very observable to an English eye, as, whether from a lack of Gothic taste or from the wealth of our own country, every fashionable ornament in which gems are to be set must contain gems of each particular kind, perfectly similar one to the other in colour and in shade or degree of colour. Thus, if turquoises are employed, they must be all of the same tint of blue, none must be paler or darker than the others : if pearls, they must be of precisely similar lustre and hue ; if one inclines to pink, all must do the same, and so on. So with diamonds, rubies, emeralds, sapphires, &c. But on the Continent, whether from choice or necessity, the jeweller generally adopts the opposite course. He seems to take a pleasure in employing turquoises of different colours, and pearls of varying hues or lustre, in one and the same article, adapting them often with much art to various positions. The German nobleman who wishes to present to his lady a splendid ornament, but who can neither wait a number of years while a set of gems perfectly alike in colour is collected, nor can afford to pay an immense price to the man who has patiently and vigilantly collected such a series of precious stones, will probably prefer the German mode of setting. The Earl of Dudley as naturally prefers the English style. But this answer just given, though the natural one, is by no means the only one which would be given to the question.

As I look at ancient jewellery I am always interested and sometimes touched by the desperate struggles of the unfortunate designer to overcome the errors in selection of the gems made by his ignorant but wealthy patron, who has in a fit of barbaric love of display bought up everything which has been offered to him: crystals, carbuncles, emeralds, cornelians, topaz—nothing came amiss. But woe to the humble goldsmith entrusted with this collection of lustrous blunders with orders to set them appropriately. It is the highest praise to the mediæval jeweller to say that he overcame such difficulties and such errors.

All I have seen of such work has led me to believe that the ancient jeweller made the best of the gems he had to employ; but if he could have obtained these to his liking in form, colour, size, and brilliancy, he would in very many instances have matched the stones with the minutest exactness, and would often have come very near to what I have called, by way of distinction, the English style of setting.

It is a fact significant of the relative purchasing power of the country, that the best gems indigenous to it are not found in the Austrian display. The display of Hungarian opals is not very large; and it is in the exhibits of other countries that we find the grandest specimens of these gems.

As a novelty, I must not forget to mention a very beautiful cross for the Greek Church, in the case of Mr. Granichstadten, the court jeweller of Vienna. It is set with emerald cameos of the Saviour and Saints; these cameos are curiosities, as the emerald is so fragile and even brittle a stone, that such carving is a work of much danger and difficulty. It is questionable taste to put a dead surface on a stone of high lustre like the emerald by carving it; but this is a moot point, which would equally apply to glass engraving.

The large trade in jewellery set all over with Bohemian garnets does not evoke much in the way of novelty of design, or any new features in the manufacture. The kaleidoscope would produce most of the arrangements employed, though it is perhaps no discredit to the designs to say this, as the star motives and flower forms usually worked upon are certainly best adapted to display the lurid lustre of these not very valuable gems.

There is much common silver niello work in the German cases, none of it remarkable in form, much of it delicate in treatment, but showing little beyond the simplest efforts at design. Amber jewellery, of which there is very much, exhibited chiefly by pipe makers, is particularly heavy and uninteresting. An ingenious writer might draw an elaborate inference as to the relative positions of men and women in Germany, from an analysis of their brooches as compared with their pipes.

If, however, a notable comparison of the merits of German as contrasted with English jewellery were required, both as to design and manufacture, it would be found in the department of black glass jewellery. A visitor looking first at the case of Joseph Schubert, and going then direct to the matchless exhibit of Whiteley, of London, would learn a lesson he could not easily forget. Any further remark is unnecessary. Finally, as to the gilt, or imitation jewellery, the Germans, if we may judge from their cases, are as inferior in style and finish as it is possible to conceive, to both French and English makers. Much of the work in that class exhibited is beneath contempt, and the marvel is how it was admitted into the Exhibition building. Possibly, however, it may be a compliment to these Continental brethren of ours, to tell them that they are as yet unsuccessful in foisting upon the public imitations of articles in gold and gems.

In chains, there is such an utter absence of anything remarkable, except for close imitation of patterns which have been for many years in use both in France and England, that it is hardly requisite here to do more than register the fact. The German designer appears as yet to have hardly begun to direct his energies to the improvement of this branch of manufacture.

FRENCH JEWELLERY AND TRINKETS.

On finally parting with the German exhibits, scattered as they unfortunately are through many parts of this immense building, and entering the French Court, it is impossible to avoid an involuntary feeling of disappointment. After the numerous and beautiful cases illustrating German production, the French department, as to its jewellery, appears miserably thin and poor. The first thought arising in the mind is that the glories of the French goldsmiths' art have been decidedly overrated; but on closer inspection it seems more likely that the exhibits convey no adequate idea of the extent of the manufacture, or of the variety and novelty of its designs. The truth probably is that the disastrous war in which France has lately been engaged, and particularly the long siege of Paris, have so far limited its production, and impaired the purchasing power of its people, that the jewellery trade there has received a blow from which it will but slowly recover.

Speaking candidly of the French display as a whole, it must not be imagined that it contains no fine specimens of artistic jewellery. Bissinger, of Paris, has in his case quite a series of cameos perfectly superb in their purity of design and delicacy of execution. Rouvenat has much gem work of great beauty; Mellerie has more, though the generally heavy character of his designs seems to go beyond a perfect ideal of what such decorations ought to be. I am bound to say that the style and finish of the gold work of these and other first-class makers is beyond all praise; and that the setting of the gems in the works exhibited is equal, if not superior, to that of any other country. The French are believed to have introduced that system of setting bright and other gems as closely as possible in an article, so that very little of the gold or silver in which they are set is visible. They thus present a perfect galaxy of light or colour, or both; which gives a magnificence of effect such as no other style of setting possesses. It is considered by art critics as in very questionable taste to make court jewellery into mere exhibitions of wealth in gems; but there is, I fear, no chance of such productions becoming less fashionable until the love of riches and of gorgeous show cease to have a hold upon mankind.

In this department of gem work, the French, if they have not maintained their ancient supremacy, at least divide the honours with England as to quality and artistic merit. There is, however, in their exhibits nothing equal in splendour to the jewels of the Countess of Dudley, now in the case of the Messrs. Hancocks, which certainly are alone in the Exhibition for their matchless beauty and grace. The law of taste I have referred to as applying to English jewellery, under the name of the single-colour theory, is almost invariably adhered to by the Paris goldsmiths in their finest ornaments. Each jewel contains but one positive colour, the dress of the wearer being expected to harmonise it.

The mounting of cameos in gold or with gems has been pursued with much sweetness and beauty of effect by French manufacturers exhibiting. I believe they have the merit of introducing into such work panels of ornament delicately pierced through open borders. This was an old art revived, but differently developed; it became a fashion, nay, a rage; it extended far beyond the limits of France; it has reached its meridian of popular favour, and is now on the decline. In thus declining, it may almost be said to have received its death-blow from the hands of those who introduced it, in the extremes to which it has been carried. A pendant for a lady's neck is now so pierced through and through, it is so cut and slashed, so perforated in every part, as to be positively objectionable.

Apart from these extravagances of style, which demand notice. as they are so numerous, there are in the French cases many notable instances of true and effective design. In a small collection sent by M. Emile Philippe, by no means a demonstrative exhibitor, there are a variety of articles exquisite in workmanship and pure in taste. With him the brooch takes a shape much more reasonable, and much more like the ancient forms of such articles than any of the specimens above referred to. This brooch, as shown in Fig. 32, is long and narrow, in fact, precisely the form which seems most suitable for crossing and holding together the parts of a lady's dress. The centre part of this brooch is usually slightly raised above the sides, while the ends and edges are often fitly enamelled in colours upon flat surfaces. This enamelling in various colours upon the surface of the article of personal ornament brings us again to the vexed question already discussed (i.e., that of various colours in one jewel). In justice to this art jeweller, for he surely is one, it is only proper to state that his colours are duly subdued, and kept in harmonious relation to the gems which may occupy a prominent position in his ornaments.

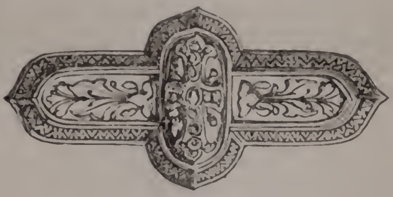


Fig. 32.

Among the besetting sins of French designers of jewellery, may be mentioned their love of imitating textile fabrics in works of gold and silver. It has long been laid down by great authorities as a rule of design, that it is false in art to imitate a manufactured article in an altogether different material. Thus, for instance, tassels and fringes, which are appropriate in the case of dresses, tapestries, or bed hangings, become now, according to the recognised rules of good taste, altogether inappropriate when copied in metals such as gold and silver. We are commanded to go to nature for our forms, motives, and principles of design in all branches of manufacture, and are not allowed to pilfer or slavishly to borrow from one manufacture the forms and modes in which it works. This last absurdity, which I had hoped was fading in the light of a better day for Art, has been carried a step further in Vienna. Tassels are not only suspended to earrings and brooches, fringing necklaces, and used as terminations to châtelaines, but are coming out as a novelty hanging to the ends of gentlemen's Albert guards.

As a set-off to this apparently increasing evil, I must mention that the efforts of the French designers of chains are often bold and original. They afford evidence of a sincere desire to elevate these articles above that wearisome lace, or twist, or rope imitation which has done so much to demoralise this class of goldsmiths' work. When an article in metal is so constructed as to deceive the eye on a casual glance into an impression that it is a textile or other similar fabric, the boundary between the arts is destroyed, and the article becomes, accurately speaking, a display of artistic falsehood and folly. A gold chain, however delicate it may be, should convey the idea that it is composed of a metal, and a precious metal. This praise, then, must be given to the French chain makers, that they have aimed at, and in some degree accomplished, this difficult task. While indicating clearly the true character of the material of which the chain is composed, they have often adopted an ingenious method of diminishing its apparent weight by an open pierced ornament in four parts, which is a very beautiful feature (Fig. 33). This effect is true to art, affording a most agreeable relief to the eye, without necessarily diminishing the strength of the chain itself. A novelty much affected by French manufacturers, is the manufacture of trinkets in oxydised silver, set occasionally with garnets to very good purpose, but seldom with other stones. This class of work affords a wide field for the artist in repoussé, whose model is cheaply reproduced by means of casting or electro-deposition. Many able imitative compositions of this kind are to be found in pendants, earrings, solitaires, and cravat pins.

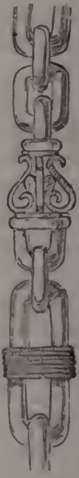


Fig. 33.

After all it is in gilt metal work and imitation jewellery that the boldness of conception and richness of fancy for which the French are remarkable is most fairly displayed. Although here we cannot avoid observing what a fearful chasm in their skilled industry was caused by the late war, yet it is amazing with what vivacity the French manufacturers have endeavoured to bridge it over. Their imitation gems are brought out splendidly, are well cut, and have much of the colour and fire of the originals.

The settings and ornaments in which they are arranged are frequently beautiful, though the fragile lightness and airy flimsiness of treatment of many of the examples does not recommend them to an English eye. If the Birmingham imitation jewellery had been at all represented there, its style in the mass would probably have been much more striking than the French display. Yet it is but right to remark that the general excellence of such Birmingham exhibit would arise from the fact that most of the articles composing it would be copies of jewels which had been originally designed and made in gold, had in that expensive form caught the public taste, and had become so far fashionable as to be worth pirating. The French imitation jewellery is, on the contrary, more frequently original, and its makers must therefore be superior to our own, at least if we are justified in taking into consideration the genuineness and honesty of a design.

ITALIAN JEWELLERY.

On going from the French to the Italian Court, and passing the master-pieces of wood-carving and Venetian glass, we come at last to the greatest triumphs of the goldsmith's art in modern days, in the cases of Signor Castellani of Rome. This eminent goldsmith, having for many years studied the characters and the processes of manufacture of the exquisite gold ornaments of the ancient Etruscans, which have been discovered from time to time in various parts of Italy, has succeeded in reproducing their main features to an extent never before attempted. Some of his works rival the beauty and delicacy of the originals, and, what is still higher praise, he has carried out upon the same principles of art which these old-world goldsmiths followed, a number of his own designs. These principles, which we see carried to a degree of perfection such as we find in no other display in the Exhibition. involve in the first instance the general rules of classic art—simplicity and purity of outline, just divisions of surface, and ornament obtained by an entirely conventional treatment of natural forms. But beyond these is another and the most important principle of all, so far as it relates to our subject. It is this: that all the art of the goldsmith should tend to display and enhance the value of the material in which he works by his delicate treatment and refined manipulation. Brass, being cheap and plentiful, may properly be displayed in masses, and is fitly seen in the bold lines of the cornice or the artistic sweep of the chandelier. But gold, from its intrinsic value and its general scarcity, is as naturally adapted to articles of smaller proportions, as it is also susceptible of an exquisite finish. Its extreme ductility also should be taken advantage of by the art-workman, and made to illustrate his best decorative ideas. Signor Castellani has, then, carried out these demands of educated taste with a skill and beauty which in these modern days is all his own. His articles are all studies of classic art-workmanship, and, soon after the opening of the Exhibition, were every one deservedly sold at prices which amazed every goldsmith who heard them stated.

If it is permissible in speaking of the productions of one who has not only obtained an European reputation, but has gained the position of an authority and a guide in the goldsmith's art; if it is well, after examining so sweet a display of truth in design, tenderness in form, and facility in execution, to give utterance to a passing shade of regret, I would fain do it. The very delicacy of this art-manufacture has led the goldsmith occasionally to approach or to fall into the common error of imitating in gold the fringes and drops of textile fabrics.

Next in point of excellence to Castellani, as exemplified in the Vienna Exhibition, comes S. Bassano, of Venice. His works, which to my judgment are evidently designed to meet the demands of English visitors to the Continent, are generally decisive in form, often simple in treatment, with more plain surface than is usual in the works of Castellani. He deals less in Etruscan reproductions than the great Roman goldsmith; and though the classic spirit pervades his designs, they are characterised by a certain vigour and freedom which is as interesting as it is refreshing. His topaz and amethyst cameo pendants are curious instances of this daring spirit of innovation; and although it is uncertain whether the best taste will condone the giving a dead surface to a stone of high lustre and powerful colour by carving it, one is almost inclined to forgive the solecism for the bold and almost Gothic manner in which it is carried out. The head, which is in high relief, and dull in surface to show the details, lies in a polished hollow, as shown in Fig. 34. By the section it will also be seen that the edge of the pendant is treated with corresponding vigour.

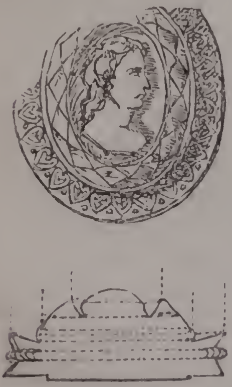


Fig. 34.

Coming now to the mosaic jewellery of Rome and Florence, it does not appear, from the specimens exhibited at Vienna, as if this art has made any progress during the past thirty years.

The workers seem to have become themselves fossilised into a set of habits and tricks of design which are to a certain extent beautiful, but the external sameness is profitless and oppressive. As an exhibitor, Geraldini seems to take the lead; but judging from the display generally, the art seems almost to have sunk into a mere trade with visitors, who purchase examples as souvenirs of their stay at the places where the mosaics are produced. The poverty-stricken ear-ring (Fig. 35), the brooch with its narrow rim of gold, or what passes for gold, and its execrable finish, are much too frequent, and might therefore almost be taken as types of this class of work.

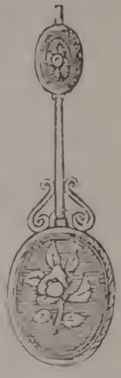


Fig. 35.

A word must be said of the enormous quantity of filigree work which forms the employment of so large a number of the gold and silver smiths of the South of Europe. This work is often very delicate in execution, sometimes pure in form; but as it is usually limited to the imitation in gold or silver of lace or other textile fabrics, so I consider that it goes beyond the legitimate province of the true art-worker in the precious metals. Its very delicacy and apparent refinement will ensure it a sale among those of the public who regard rather the fashion and the appearance of an article than its adherence to any rules of art. I nevertheless believe that its popularity will slowly but surely decline, as art education on these subjects becomes more perfect and extended.

In the department of coral jewellery, for which Naples is so well known, Ascione has some novel and pretty arrangements; also some curious and tasteful articles in tortoiseshell; but this kind of work, from its very nature, does not admit of anything beyond the mere elements of design.

SWISS JEWELLERY.

At Geneva, whose manufactures are best exemplified in this class at Vienna by the works of M. Lejeune, we find the Swiss gradually departing from those methods and styles of work which the Italians chiefly affect, and coming nearer to the solid and somewhat massive-looking gold work which is always supposed to appeal best to English taste. The method of production is evidently that of individual labour—the article is altogether wrought by hand, and it is evident that it has frequently been specially designed also. This is shown by the fact that there are many attempts to bring out the character of different styles—Egyptian, Assyrian and Roman. We are evidently going northward, for the differently coloured golds of the French and Germans again become employed, and many of the tubes and gold edges are polished bright. Some pretty and some very ludicrous imitations of objects, natural or artificial, also appear in gold. As an example, a golden guitar intended to serve as a brooch, a pair of smaller guitars *en suite* to hang from the ears of the same lady.

The Swiss are noted watchmakers, and are now adding to their accomplishments in this direction great ability in the design and manufacture of châtelaines and watch-holders. The number and variety of these articles in the Exhibition suggested that half the ladies on the Continent either wore or intended to wear such ornaments; if, as usual, such a fashion is about to extend to England, its gold and silver smiths had better "take time by the forelock." The Swiss châtelaine is an elaborate and often a splendid ornament, in which gold of different colours is employed with much advantage and effect, while in general the designs are constructed upon a strictly geometrical basis, though occasionally animals, birds and flowers make their appearance in its compositions. Of these watch-holders the firm of Badollet and Co. of Geneva, have exhibited many very fine specimens.

Not only on the châtelaine, but also on the back of the watch itself, the Swiss find room for the display of much art—chiefly by engraving and enamelling. This is a matter well worth considering, as nothing seems more appropriate on the back of a watch-case than a variety of colours in enamel, harmoniously disposed. The designs for Swiss watch enamelling are, as a rule, simply æsthetic in character, but the forms are often good, and the colours well balanced.

SPANISH JEWELLERY.

In passing over the very limited supply of Spanish jewellery in the Vienna Exhibition, I must not omit to mention the beautiful damascened work of Teodore Ybarzabal, of Guipuzcoa. His manufactures consist of genuine damascening of gold upon iron ornaments, such as lockets, brooches, tazzas, &c., besides arms, and it is not too much to add that the forms are good, though often simple—the lines of the decoration are good, and the distribution of the ornaments in gold over the spaces is very true to art. The cost of these articles, moreover, is remarkably small, and it was a matter of much surprise to British workmen to find that the relative value of such difficult and delicate labour was rated at so low a price.

DANISH JEWELLERY.

After the short excursus into Spain, we may pursue our journey northward till we are met by the display of V. Christesen, of Copenhagen. He is the only but the imperial representative of the art of the goldsmith in his own country and in all Scandinavia. It is an approach to the work of Castellani in delicacy of treatment and in purity of style, though in the character of its forms and decoration it is as different from the style of the great Italian as can well be conceived. It is, however, a singular fact that its peculiar excellences have been attained by a course of study on the part of Christesen equally earnest with that of Castellani, in Italy, As Castellani examined the work of the ancient Etruscans, so Christesen has pondered over the remains which have come down to us from the ancient Scandinavians, Celts, Franks, and Goths. After much care and close analysis he set himself to reproduce the spirit of the ancient style, its methods and principles, in articles adapted for modern use and personal ornament. In this he has succeeded to a degree which he, probably himself, never expected when he commenced; and his success is all the more laudable, as he has obtained it, not by slavishly copying the examples left us by past ages, but by working parallel with them, as it were, and by adding to their worthy features the novel requirements of the nineteenth century. The interlaced patterns, the spirals, the gold wire and bead work, the ancient band decoration, is very beautifully employed, on the surfaces of articles which often partake somewhat of the present approved shapes. Many of these articles are exquisite studies for the goldsmith, and the novelty of treatment adopted opens a wide field for art workmanship such as must be admired and purchased in the markets of the world. If, indeed, there was one thing I could have wished for more in the exhibits of Christesen, it was that he had availed himself still further of the great variety of shapes and curiosities of treatment of ancient personal ornaments. In a small museum in the Schloss, at Mayence, I was struck with the scope, interest, and beauty of these old ornaments, which are excellently illustrated there. In order to render this collection as complete as possible, the lack of original specimens was supplied by perfect fac-similes from the museums of Copenhagen, Munich, Stuttgardt, and other cities. I felt that there was room for study, and suggestive materials worthy of the attention even of the great Danish goldsmith.

The success of Christesen in his gold work is hardly extended to his pieces in which gems are employed. Whether from choice or otherwise, the very imperfect methods of setting stones which existed in the earliest ages is carried out in these modern ornaments. Moreover, the gems are themselves as irregular in form and colour as in ancient examples. I deplore this copying of the accidental faults of jewellery in past times, to the causes of which I have already referred, and deplore it the more, as in many other respects Christesen has in his reproductions discriminated so judiciously between the excellences and the defects of his originals.

Russian Jewellery.

From the masterpieces of Denmark to the examples contributed by Russia there is a quite wonderful transition. We have quitted the fine outlines, the suggestive shapes, and the splendid surface decoration of Copenhagen, and have got into a land where jewellery is intensely German and Austrian, but bolder, and often with a certain vulgarity of style. Thus we have a gold monstrosity called a bracelet, made in gold, to imitate the figured linen cuffs worn by ladies. This article is 2½ inches wide. There is often in this Russian work an admixture of successive curves, as shown in Fig. 36, and which prove the Eastern influence which is here beginning to be sensibly felt.

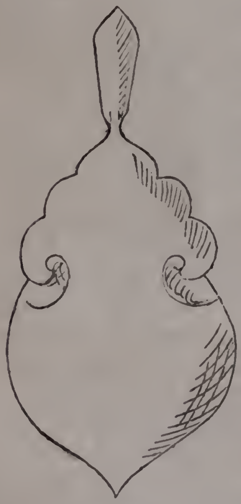
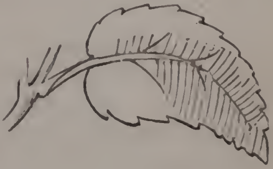


Fig. 36.

The gem work of Russia is remarkable only for its being very much assorted and very badly harmonised in colour; to complete the indictment, the stones are usually badly set. There are in the Russian collection many articles having enamel paintings in the centre, and, like the Austrian jewellery, with which they are identical in style, set with rows of precious stones of different colours, and this to such a degree that the borders often overpower the colours of the enamels. I believe that the best Russian jewellery is that made in iron, for much of this is very pretty, the lines being graceful, and the arrangement good. This class of work at least avoids the evident and crying faults of the more ambitious productions just referred to.

There are exhibited here a number of examples of Russian peasant jewellery, and as this matter of the personal ornaments of the poorer classes in all countries is now much discussed, I will take the opportunity of making a few remarks on the subject. While I have selected the Russian Department as offering a few salient points for attention, I would by no means have it inferred that its deficiencies are peculiar to itself. On the contrary, I believe that the principles upon which these ornaments are constructed are very similar to those which operate in the manufacture of the lowest class of jewellery everywhere; and it is because I hold these general principles to be utterly false and worthy of special reprobation, that I more particularly speak of them here. In the first place, one of the frequent ornaments used in the decoration of their persons by the Russian peasantry is evidently meant to be a leaf. As a remnant of the far-off past, it shows that the first savage idea of decoration was derived from Nature, but it shows also that this idea, which was a true one to begin with, by not having been raised gradually into true ornament, has been successively debased by custom, instead of being raised by Art, so that its very origin is now but dimly seen. This leaf was probably at first correctly drawn, with a stem to it, if not connected with other leaves. But now, as shown in Fig. 37, the leaf is rounded at the end; it has lost the stem, and, more than this, the two inward curves to indicate where the stem should come. This degradation was probably enough, but it is not so. The next step is to put a rude but continuous border round the bit of base metal, to deprive it still more of any resemblance to nature it might yet possess; the climax of debasement is reached when two small rings are attached to one side of it to fasten it to something else equally devoid of any claims to art or beauty. Such abound in peasant jewellery, and are often hung to several rows of chains forming necklets. Sometimes rows of small coins are interspersed with these, or worn in rows below them. Occasionally small coins, with a few bits of silver or brass attached to them, are employed as earrings, or to form a grander chain or fringe (Fig. 38). This



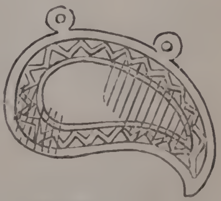


Fig. 37.

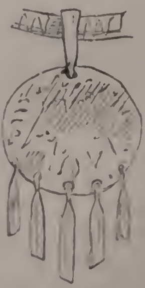


Fig. 38.

may be again varied by two inverted crescents, in style evidently coming from the East, forming a centre pendant, as in Fig. 39. I believe from this and most of the peasant jewellery I have seen, that, whenever the first natural ideas of men as to decoration have been ignorantly copied from age to age, they have produced results which are most debasing and pernicious. The first efforts of men, however rude, in the decorations of their few articles of use and ornament, are often beautiful as far as they go; and why? Because they are called into being by wants keenly felt and clearly understood; because they fitly and aptly minister to their wants; and finally, because the mind, unfettered by custom, nor provided with bad models, generally draws its inspiration from objects in surrounding Nature. The first efforts of the savage usually move in a direct line (the line of true Art), in so far as he is uninfluenced by examples. The lesson learned by me from peasant jewellery is—How all Art is degraded; how ugliness of form becomes habitual; how deformity becomes admired and preferred to beauty; when men ignorantly persevere in blind imitations of those things which existed before them.

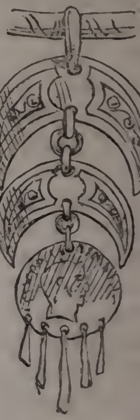


Fig. 39.

Indian Jewellery.

Extremes often meet, though it is perhaps well, after discussing the relapse of savage art into peasant jewellery, to examine the works of a nation which has succeeded in keeping up a goldsmith's art for more than two thousand years. Whatever his errors, there is no denying the evident facts that the Hindoo is a skilful workman and that he has definite ideas of design. His forms are often intricate, and, for purposes of comfort in wear, are largely composed of curves. If any angles occur in his outlines or projections, they are generally so placed as to avoid any dangerous contact with the arm or dress of the wearer; and so far an article fulfils the first requirements of true Art. The delicate work in such a jewel is also usually protected by strong borders, which form panels on the surface, afford division to the design, and so give a real as well as an apparent strength to the ornament. Forms derived from natural objects, leaves, stars, and flowers, form the appropriate bases of all their interior decoration of the panels just mentioned. These are treated on purely conventional methods; the work is always intricate in detail, but in good keeping. Their filigree ornament is among the most perfect and delicate in the world.

So much for the beauties of the productions of these poor Hindoo goldsmiths, who will so humbly sit down under the verandahs of their English lords, with their little pans of charcoal, and for a mere pittance and a few handfuls of rice will fashion the gold weighed out to them into exquisite personal ornaments. We must honour the delicacy of their manufactures, and the praise must be still greater as they have for so many ages, in spite of the deteriorating influences described in speaking of peasant jewellery, kept up the style and merit of their works. It only remains for me, however unwillingly, to say a few words respecting their defects. Indian art is always the same, always excellent, but the art-workman never gets beyond himself. Possibly the genius of his religion keeps him stationary; at any rate he seems to have no desire (though perhaps it is because he has no opportunity) to go forward to still greater excellence. His forms, which are generally curved as above stated, may be too frequently bulbous, while the intricacy of his lines forbid any daring forms and preclude any bold flights of fancy. His delicacy becomes occasionally mere artifice, and his love of subtlety in design sometimes degenerates into mere cunning. Still, in these days of rushing after novelty, regardless of precept or of principle, the poor Hindoo workman, with his thoughtful and painstaking labour, deserves more attention than he often gets. If he is incapable of pursuing the highest walks of art, he is still more incapable of the machine-made abominations, of the wretchedly vulgar slipshod work which comes out of many modern workshops in civilised countries and is dignified with the name of "jewellery."

TUNIS JEWELLERY,

Which is to a small extent represented at Vienna, sends some interesting filigree work, curious from its resemblance to Indian jewellery as just described, though its forms are less pure and its manipulation less perfect.

JAPANESE JEWELLERY,

As it has been in previous Exhibitions, is also here unique in its display of articles of jewellery containing quaint diminutive figures, and bas-reliefs in metals of various colours, remarkable for their charming accuracy and skill in treatment.

It was a deserved compliment to their perfection that they were nearly all sold in a few days after the opening of the Vienna Exhibition.

I cannot avoid the belief that while we, as a nation, are equal, and perhaps superior, to any of our Continental neighbours in our best gem jewellery, in the finish of our work and the perfection of our setting, yet that the French and Germans are bidding fair to surpass us in these respects, and are probably paying more attention than ourselves to other branches of the goldsmith's art. France has done much, and may do more, to supplant us in the favour of other nations to whom we formerly exported many of our works in this class. Germany is already beginning to monopolise some markets, although she is labouring at present under some disadvantages. To begin with, there is that curse of cheapness, which although it has obtained her some business, has limited her too much to that kind of work, and tended to cripple her efforts at design. This again forces employers to have several apprentices or boys to every man, in order to cheapen work, and the system is a great evil. But once let Germany get over these difficulties, and, if she manifests the same energy as now, she must divide the markets of the world with any competitor.

The condition and habits of the German working jeweller are not altogether unfavourable to the development of the national trade. He is one of many apprentices, and therefore must excel, or he leaves a regular employ, and becomes one of the numerous out-workers who earn a precarious subsistence by taking out work commoner and cheaper than is usually done in the shops. He is content in a humble sphere, works long, quietly, and regularly, neither asks for nor takes his Saint Monday like his British brother, and in the evening walks out, goes to a *café*, takes his few glasses of beer, but seldom or never becomes intoxicated. He marries, and begins his humble home-life with furniture which his wife's industry often procures for him. His children he sends to school when forced to do so, but draughts them off to work as soon as he can—girls and boys alike. Thus he is docile and obedient, a living machine in the hands of his employer. He fits into his place easily, and does what is required of him well. Division of labour being in the jewellery trade even more perfect in Germany than in England, much more is done there with the same expenditure of money. This may not always continue, but while it lasts the German maker of jewellery can compete in price with the world. He also employs a professional designer, so that he may be able to compete in the element of style.

These facts, which all have more or less bearing on my subject, suggest many obvious reflections. They show that the English jeweller goes out into every market more heavily weighted than his Continental neighbour. His labour costs him more, rent and taxes cost more, and he has not often the advantage of a regular designer.

The natural inquiry, therefore, that suggests itself is, What is he to do? He is not likely to be able to lower wages, even if he wished, for men have been lately successfully agitating for higher rates. He cannot lower rentals, for house property in England is daily becoming more valuable. Nor can he expect any material reduction in national or municipal taxation. He may improve design in his works by the constant services of a professional designer. This will be something; but I believe more may be done, both for him and for themselves, by the main body of working jewellers, who in this matter are chiefly concerned. It is in this part of the subject that I think the whole gist of the question lies.

Every designer, and every manufacturer who is accustomed to examine work made from drawings, knows what a wonderful difference there is between the production of the man who can draw well himself and that of the jeweller who is ignorant of the art. One will give a true and beautiful line to every part of the article; but the other, without appearing to depart from the drawing, and without being himself aware of any fault, will preserve every measurement he can make, and yet mar every feature of the ornament in working it out. The educated eye of the workman is as important to the master and to himself as is the idea of the designer; and hence it is that it behoves British workmen to do their part, and it is the most important part, in assisting their country to maintain her position in the markets of the world.

It should be clearly borne in mind that the German working jeweller spends at the board from ten to twenty hours per week, on the average, more than the English journeyman. If the British working jeweller has so many hours more leisure than his German neighbour, why should he spend all that extra time per week in amusement, idleness, or worse? Would it not be far better for a workman to exercise a little self-denial, to give up, say, ten hours per week of the leisure he enjoys over and above that enjoyed by his German brother, and to spend that time in the study of the arts of drawing and design? It will open his own eyes to the beauties of his art, and enable him to take a much higher position among his fellow-workmen, who may lack such knowledge; for employers are always quick to recognise such ability as this study will give him. Yet more, this self-culture will give to the workman higher pleasures and nobler aims in life. If every such English jeweller would spend his leisure in the regular study of art, I believe that there would be, even in three years, such a change in the character of English jewellery as would undoubtedly place it beyond competition for delicacy of treatment and true harmony of form.

Our countrymen have all manual dexterity, they have all necessary ability to give to gold that exquisite finish of which it is susceptible, and which is its distinguishing characteristic, but they sadly want art education. They have besides many important advantages over their German brethren. In addition to their extra number of leisure hours, they are not compelled by a paternal Government to leave their business, just as they are beginning to get proficient in it, to spend from one to three years in the drill-ground, in the canteen and the barracks. English artisans are better fed, better clothed, and have in general more vital energy. Let them therefore make the best of these advantages, and employ their greater leisure for the good of their country, their trade and themselves.

It is to them more essential that trade should not leave the country than it is to the capitalist. That the jewellery trade is in some branches leaving this country I am satisfied, and several large houses have established manufactories on the Continent, which enable them to compete in markets from which they would otherwise be excluded. It will go on increasing until the British artisan can raise himself to the occasion, and meet the demand for art-workmanship which is growing more urgent day by day. Men could once work by rule of thumb; they must now work by rules of science and by rules of art; if they will not do this, they must give place to others with nobler aspirations, larger brains, and finer culture.

Manufacturers can only assist in this matter; they can neither persuade nor compel artisans to study art unless they are disposed to do so. They can do much to facilitate such studies, and can exert a very powerful influence on the rising generation. They can raise museums, provide lectures, and initiate schools of design when they do not exist; they can support and improve them when they do. If art-instruction is forthcoming, they can do much to cause the young to attend such instruction. To illustrate my meaning I may state that it has long been a custom with the first firm of Birmingham goldsmiths, to receive apprentices only on condition that parents or guardians will undertake that the apprentice shall be regularly instructed in drawing and design until he attain his majority. This has been productive of the best results, and should be universally adopted. In the manufactory referred to there is scarcely a man, certainly not a young man, who cannot work from a drawing which may be given him. If all jewellers would carry out such a regulation, the result would be a general elevation of the artistic standard of the work.

It must not be imagined for a moment, in thus closing my Report on the jewellery of the Vienna Exhibition, that it is intended to cast any reflection upon the English work exhibited there. Having already shown my appreciation of the Court jewellery displayed by Messrs. Hancocks, the black glass work of M. Whiteley, the goldsmith's work for the middle and upper classes exhibited by Thomas (the best of its kind), and the excellence of the Scotch jewellery of Aitchison, I have summed up the British exhibitors.

In conclusion, I trust that this great branch of our national industry will still maintain its vigour, take advantage of all the developments of Science and of all the advances of Art, that it will appeal more and more to the improving taste of an enlightened public, and take and hold an honourable place in the vanguard of Industrial Progress.

Jewellery, chiefly concerning its Manufacture.

By ARTHUR McKEWAN, *Practical Jeweller, Birmingham.*

THE exhibition of jewellery was very large, yet there was not a fair and equal representation from the different nations. In this, as in all other kinds of exhibits, Austria had the largest share, and in this "specialité" America had none, while several of the minor and outlying nations sent very fair examples. The exhibits varied more in character than quantity. Most of the nationalities appear to have a separate and distinct style and character in their jewellery, so that with a very little study one may tell the local origin of most of the articles. This does not apply so much to the more valuable and costly works in which precious stones are introduced, as these are produced only by a few of the European nations, which from their high-class character are generally similar in style. But the difference is more apparent in the jewellery worn by the middle and lower classes.

SOUTH SEA ISLANDS ORNAMENTS.

We found in some of the exhibits from the Aboriginal tribes of the South Sea Islands examples of ornaments for personal adornment very true and suitable to the condition of the people: necklaces, earrings, &c., were made up of bleached shells and fish scales; these were very light, white, and would contrast well with the dark skin of their wearers. Ornaments were also made from a dark-coloured bean; these would be quite in accordance with good taste.

NEW ZEALAND JEWELLERY.

From New Zealand came a few specimens, principally quartz and gold nuggets, mounted in a light manner with a small bezel of gold, surrounded by gold leaves, and twisted, evidently having an English origin, and not remarkable either for originality or beauty; some agate stones were also treated in a similar way, the collection indicating that the wealth and labour of the Colony are not spent in producing jewellery.

JAPANESE JEWELLERY.

The Japanese exhibited specimens of ornaments in their usual quaint style ; they proved very attractive, for most of the samples were sold. There was not the display of gold, or jeweller's work, about these, as in European jewellery, but they are works of art made from very limited materials. For example, there were several sets of studs of the ordinary size, about three-eighths of an inch in diameter, on which the artist had introduced small figures of men and women in relief on a dark or oxydised ground ; parts of the figures were relieved by covering them with enamel or gold. There were larger discs of a similar character for brooches and bracelets covered with natural objects, such as birds, trees, and flowers ; some also represented the sports and humours of Japanese life, embodying its comic and tragic phases. These subjects were worked out with such clearness and fidelity as made them unique alike in conception and execution. There were no two articles alike ; all the subjects were different ; there is therefore every probability against their having been produced by dies. Again, the lines were too sharp, the figures too sharply wrought out, to admit of the idea of their having been stamped in dies. They seem to be produced by hand labour, raised from the flat metal by the "repoussé" method ; the gold, where shown, is either inlaid (which is the most likely) or gilt by a process similar to parcel gilding. The mounts or settings of these discs were very rude, consisting in most cases of a plain bezel not very well fitted turned over at the upper edge, and very little further ornamentation given to it ; the workman evidently not wishing to overpower the ornamental centre.

There were also some fine cut rock crystal examples in conical, spiral, and convolvulus forms, suitable for solitaires and other ornaments, very well cut, and polished in their way a novelty.

INDIAN JEWELLERY.

The specimens from India were of a similar character to those familiar to us through recent Exhibitions. There was also a large and good collection of what we may term modern Indian jewellery, by Watson of Bombay, consisting of some large lockets and bracelets of a kind of repoussé work, with figures and scenes of Indian life and character worked up on the surface ; these were very characteristic, with the defect usually prominent in Indian work—the want of perspective. The figures are all at the front, shown of equal size, and equally prominent, so the subject loses its good effect. Another feature mars the appearance; it is the very rich bright yellow colour given to the work, which perplexes and dazzles the eye in trying to make out the subject represented; but the effect of the whole is very rich, the cavities containing the colour making a gorgeous looking object, but this at the same time sacrificed the true value of the artist's skill in working up his figures.

Other examples had a different character; instead of the figures worked up, the surfaces were covered with a profuse display of rubies and emeralds, further embellished with very brilliant enamels. With this feature noticeable is also the difference in the way the gems are displayed to what they are with us. In English jewellery the stones usually form part of the design, and in so doing contribute to increase its beauty and worth; in using a number of stones we seldom isolate them, but usually mass them into some ornamental form, subordinate to the shape of the article on which they are placed. In the Indian jewellery the general contour or shape is not so much studied (certainly there is variety on a small scale), but the end desired is to produce an effect with the stones in combination with enamels; almost any ground would serve, the placing of the stones having very little relation to the form of the ground work. An English workman, in placing a number of stones on a round shield, in all probability would choose some form to allow him to mass the stones in the centre. The Indian scatters them all over, and not placing two together, they look as if they had dropped on accidentally; but still the stones are so related to the enamels used in conjunction with them, that the arrangement proves a good one. With respect to the enamels, they constantly use very brilliant colours, so disposing them that they intensify the display of colour already given by the stones; if we use enamel in conjunction with rubies, it would be such a subdued colour as lilac, or a contrast, as white; but the Indian freely uses a red, not alone, but in conjunction with white and black; this, while it prevents the single stone being seen to the best advantage, saves it from an apparent isolation, and gives a gayer and livelier effect to the whole.

The brilliance of their colours depends very largely upon the gold they use being of such high quality (most of it being pure or almost pure); still, with that admission, they obtain greater clearness and brilliancy than we can. In the opaque enamels they are being largely copied by other nations; it is their habit to put small clusters of enamel on different parts of the work, painting small dots, stars, and other little marks upon them, securing by these small details a work full and complicated.

The gold being of such good quality is consequently very soft. To provide for that contingency it is usual to fill all their hollow goods with cement melting at a low heat, which, when poured in, sets very hard, and keeps the article from breaking.

The setting of the stones is very rudely done, most of them being fastened in with the edge of the bezel, and very little care being given to exhibit their beauty or brilliancy; the stones are seldom well facetted; they are chiefly in the convex shape (known as tallow cut), thus preserving their size, but sacrificing their beauty and fire.

The commoner kind of jewellery worn by the poorer classes (for it seems customary for all classes in India to have some jewellery adornment), as earrings, necklaces, bracelets, anklets, or rings for the finger or to be worn in the nose—those shown were made chiefly of silver filigree, or of small flat and other ornamental pieces of metal strung together. Some very good-looking necklets were thus made, being very primitive and rude in construction, with no mechanical finish about them; but, considering the appliances at hand used in their production, they were not bad specimens of handicraft. One noticeable feature in them is the absence of soldering as far as possible; the effort is to produce an ornament without the use of the lamp. For this purpose they use a large quantity of wire, which they can readily draw through their draw plates, or flat pieces they cut out of thin metal; and if decoration desired is to be more ornamental, the flat pieces of metal are embossed with small punches, and the small pieces are attached by rings and chains to form different articles. By a repetition of these simple elements they produce with a few forms a pleasing and complicated design. Some very thick, heavy-looking anklets were exhibited, produced by casting, and very roughly dressed up, the rough file marks left in as though they had just been taken out of the vice. These were in the form of a large ring about four or five inches diameter, the ends not quite joining, finished off with a small ball. The nose-rings were in style very similar to the earrings, but much larger, and for fastening on the inner cartilage of the nose by springing the two ends of the ring of wire at the top close together. Most of these rings, as well as the neck chains, worn by the men and women, bore different names, which had some religious or social signification.

TUNIS JEWELLERY.

From Tunis were some specimens of jewellery of an Oriental character, principally of silver filigree, wrought in different forms. Several patterns of earrings in the form of a canoe suspended from each end by a chain from a small top. The neck-chains were mostly made up of small thin discs of metal attached to a rude chain by a single link. Also some silver bracelets made of flat metal, with square edges inside, the band perforated with a kind of saw-pierced work into scrolls and interlaced ornament, very roughly executed but artistic in idea.

EGYPTIAN JEWELLERY.

In the collection from Egypt there was a large quantity of jewellery, very unlike in character the relics of ancient Egyptian art. Most of it was silver filigree work of the usual Eastern type, with no noticeable difference from several exhibits of contiguous countries, either in style or finish. In this collection also were some heavy massive-looking anklets, armlets, and collarets, quite plain and apparently solid; contrasted with these were some necklets with pendants attached, composed of small coins, triangular pieces of flat metal, and small embossed ornaments, united with pieces of tube, forming a kind of rough lace-work. Some of the articles made of silver filigree were oxydised and relieved in parts with gold and settings of turquoise. In one exhibit there was a recognition of ancient forms in some representations of the asp and scarabæus, executed in gold and enamel; the gold a dull yellow colour, the enamel of the "cloissonné variety, i.e. the different colours of the enamel separated by wires or narrow strips of gold, the edges of which are seen imparting an additional beauty to the enamel.

TURKISH JEWELLERY.

The Turkish jewellery was of a similar character to the Egyptian, but better made, with a higher class of finish. The small coins and pieces of flat metal connected to chains formed the leading idea. The settings of turquoises were more frequent and the combinations better, forming in some instances the centre to a flower, and used as studs for apparent fastenings in parts of the work. There was also a large example of filigree work in the form of a shield; the disc of metal to which the filigree was attached was silver whitened, ornamented with parts in gold, and further decorated by the introduction of rubies and turquoises. The leading forms worked in the filigree were birds and leaves, and the spaces filled in with scrolls. The whole of the filigree enrichment is made of twisted wires, not as most of the English filigree, i.e. of a single wire notched or knurled on the edges by means of a pair of rolls; the former has a very much more artistic appearance when properly worked up, but the latter has the advantage of fitting closer, is easier worked, and made more quickly.

GREEK JEWELLERY.

In the Greek collection, which was very limited, were some waistbands, made of plain strips of silver, with wire-work studs at intervals: also some large silver buckles and clasps for waistbands used in connection with ribbons; these were very white, neat, and cleanly finished.

RUSSIAN JEWELLERY.

The exhibits from Russia were very characteristic, consisting of large bracelets square and massive, the band flat, the edges square, the ornament built up of parts in a compact form, requiring, by its close conformation, some good fitting, which was successfully accomplished in the article examined. Most of the jewellery exhibited was in suites decorated with enamels of green and dark blue; others were ornamented with what is technically termed "gallery," viz., a narrow perforated piece of gold resembling a neat wire pattern; portions of strips of gold forming some of the ornaments were lightened by saw-piercing a neat scroll pattern in them. The whole of the examples were in the severe and massive style peculiar to the Russians, yet all were in good taste, all, while indicating strength, showed a clean and neat finish.

NEAPOLITAN JEWELLERY.

From Naples was sent tortoise-shell, coral, and lava jewellery, consisting chiefly of carvings in coral of heads, figures, and foliage; some of these were very artistically executed and highly finished; the coral used was chiefly the intense red, the pale and more expensive colour being in much smaller pieces; the gold mounts supporting them were very plain and simple. These specimens were rendered the more interesting by the small wooden models exhibited to illustrate the process of coral and lava cutting, done mostly by means of lathes with a horizontal spindle upon which is fixed stones of different sizes and quality according to the article to be cut; other lathes are used for drilling. The piece of coral is fastened on a stick with cement, and then ground into the required shape on the stones; the cavities obtained by drilling, and the carving work perfected with small tools by hand.

ITALIAN JEWELLERY.

The proper art of the goldsmith was well represented from Italy, by Castellani, Geraldini, and others, the chief feature in the collection being the great use made of wire. The greater part of the articles exhibited is covered with ornamental wire work, made out of both plain and twisted wires, bent into beautiful shapes, and laid on the plain surfaces with such cleanliness as to render the detection of any marks of solder very difficult. The forms used were very few and simple, and yet by the different applications and combinations of these, beautiful designs were produced. There was a marked absence of anything extravagant or of any effort to produce anything very novel, but a free rendering of ancient classical forms in a variety of designs. These designs embraced some very rich mountings to cameos (for which Italy is famous), consisting of a deep massive border, either with a straight square edge, filled up with twisted wires of different sizes, the front sloping towards the centre, and containing a small fine design in scrolls of plain wire, or a deep round border, ornamented with wires of different descriptions. Some brooches had for a centre the ram's-head (evidently cast), wrought very full, surrounded with a border covered to a great extent with fine ornaments of plain wire. Earrings of an ancient form were shown, representing, in some instances, a female head and bust, the lower part of the figure ending in a flowing leafy scroll, which curled up at the back and terminated in the wire forming the loop. The colour of the gold is a very dead yellow, with no attempt at brightness or relief on any part; this harmonises with this style of work very well. The surface ornamentation being very low, and the shapes usually of a solid form, give a depth and body well in harmony with the whole character of the articles.

The design of the different pieces appears to be well carried out, evidencing skill and artistic knowledge; but in what we should call mechanical skill and finish in the construction, the Italian workman is deficient. The pose and effect is carried out to perfection, but, in the matter of close fitting, or truth in the regulation of parts, why, that is mechanical and not artistic, and so it is rather carelessly done. Compare the Italian with the English workman in this respect; the Italian fascinates with the front of a brooch, and disgusts with the back; the English will more likely please with the back than the front. My meaning is that to a good Italian brooch will be found a weak fitting pin and a bad fitting box, pieces of solder on which should have been cleaned off. In a good English made brooch, the back is cared for as much as the front, and will bear as close an inspection.

Swiss Jewellery.

The Swiss jewellery chiefly consisted of châtelaines or watch pendants, having no very distinct style or character, but embracing examples of all styles, both ancient and modern; some of these exhibited under Swiss names were made in Paris.

A large number of the commoner and inferior kinds were made of silver, oxydised; the designs of these partook largely of strap and broad ribbon work; they had a very heavy appearance; some, which were of a light kind of ornament, built up into a suitable form, displayed more taste. The gold examples exhibited were in a much better style, being very light, graceful, and embellished with leaves and flowers formed from red, green, and yellow coloured gold; platinum was also introduced, producing by a simple arrangement a very good effect. One of the chief attractions in the collection were the examples of châtelaines attached to watch cases, ornamented in a similar style. These were in different styles of ornament, as Greek, Roman, Egyptian, and Renaissance, wrought out in the full character of the various periods they illustrated; enamels and precious stones being introduced. These were executed in a very finished manner: the figures or ornaments were sharply defined and well wrought out by the workmen. These examples were quite unique of their kind, having nothing to compare with them in the whole range of the jewellery exhibits.

In a higher class were some châtelaines of much finer quality: these were attached to watches of superb make and finish as far as the goldsmith's work was concerned, and comprised a pair of birds of Paradise, with the tails thrown up, connected with a neat ribbon work set with brilliants; the birds set with precious stones all over, comprising diamonds, sapphires, rubies, and emeralds. The design of one example consisted of dolphins artistically entwined and beautifully set with stones, in a similar manner. Another example was a serpent designed in a beautifully convoluted coil; this, also, covered with gems of different colours. The workmanship in these examples appeared to be excellent; the forms were well worked out, the settings close, the stones well cut, and the colours of the stones harmonised well and were of excellent quality.

The manufacture of châtelaines to such an extent is a somewhat new feature in jewellery. Among the Swiss these articles have received their earnest attention, owing (of course) to their extensive watch trade. For the infinite variety and perfection of the manufacture of these châtelaines the Swiss deserve much praise.

SPANISH JEWELLERY.

The Spanish collection was a very small one, consisting only of a few examples of gold filigree work of an ordinary kind, and of a very dull yellow colour. A grand collar, belonging to some Spanish order of knighthood, was exhibited in the collection; it had anything but a chaste appearance, being largely covered with enamels of brilliant colours, and, for an article of such high character, of very indifferent workmanship. The newest articles which came under the term jewellery in this display were some damascened or imitation of damascened iron lockets, crosses, solitaires, and other ornaments. The iron being black, the fine lines of inlaid gold and the silver being burnished bright, were rather examples of the working of a new material than of good manufacture. The make of these, apart from the inlaying, was very rude and rough; in fact, there always will be, from the nature of the material, greater difficulties in the way of making a good and clear finish, than in the case of gold and silver, which, from their ductility, apart from their intrinsic value, are the most suitable of all metals for small and intricate work. Still, with improved appliances, it might be possible to manufacture even these articles in a much better manner, and if so, they would form a very interesting variety to our present stock of jewellery.

AUSTRIAN JEWELLERY.

The Austrian exhibits have astonished the world, and in no one department more than in the jewellery exhibited. Had the quality been ever so inferior, the number of articles exhibited would have been a redeeming feature. It seemed as though nearly every jeweller in Vienna had determined to make some show, whether it were advantageous or not, and as a result there was a great deal of repetition, which it would have been better to have avoided. While the large numbers exhibited gave a better knowledge of the productive power of the Austrian jewellers, it did not give an exalted idea of their excellence. In the display made there was room for jewellery of all materials and kinds to be shown, and this was accomplished; it embraced every article which could be included under the definition of jewellery, from a common ivory solitaire up to a diamond tiara.

In ivory, tortoiseshell and meerschaum were a large collection of small trinkets, solitaires, studs, &c. The solitaires were much larger than we are accustomed to; some oval-formed were two inches long, and of a proportionate width; also some round nearly as large, turned in different shapes, plain, lunette, grooved, or as a broad tapering cone; others were engraved, the cut-out parts stained with black or blue colour; others, inlaid with monograms in gold or silver and neat ornaments, looked very chaste and pretty. In this class of articles a large quantity of amber was used. The amber being transparent, and susceptible of a high polish, made some very attractive articles. In the chains made of amber the effect was not so good; though there was variety in the pattern of the link, yet such chains had a thick and clumsy appearance.

The examples of gilt jewellery were good in design and style, though entirely produced from dies, but in the execution coarse and rough, the surfaces being left from the die, without being polished; the grain of the metal was exposed along with any defect which might have been on the surface of the die. Some of these articles showed a very good attempt at a dead yellow gild, in imitation of the deep dead colour given to best gold work, though it could be easily detected as an imitation on account of the coarse granular surface (produced by the action of the acid in depositing the gold). In the ornamentation there was a great deal of "lapped" or bright surface, making a cheap article stylish and showy looking. For style, design, and taste, they were superior to English made goods of the same class and price; for strength and general workmanship, they were inferior.

In silver all kinds of trinkets and articles of jewellery were exhibited, freely covered with enamel, and largely ornamented with niello. Niello has been used in large silver pieces for a very long time, but its introduction into small articles of jewellery is a new feature. In connection with silver it forms a very nice contrast, and is capable of being applied to a very much greater number of articles than it has hitherto been, especially as its application is so simple and easy. The articles to which niello was applied were mostly with plain surfaces, on which ornamental lines, flowers, and scrolls were introduced. The pattern for the reception of the niello is either engraved on the surface of the article to be nielloed, or the indentation to hold the niello is produced in the die in which the "blank" is stamped; the niello is placed in, fired, then ground; and the work is finally polished all over.

In passing on to the gold jewellery, it is necessary to observe, as a rule, in coloured gold only two qualities are used; these are either assayed or guaranteed to be 14 or 18-carat quality. This rule is of rather recent introduction, and is well observed, especially among the leading jewellers of Vienna, who find it to their mutual advantage to have the gold of reliable quality in their work, so that, in competition, they are on equal terms. So much is this observed that every part of an article guaranteed must be of the guaranteed quality. As an example, the following instance may be stated: some breast pins of 18-carat quality were sent from England, with stems made of bright, or 9-carat gold—a custom that is universal with us in England—adopted on account of the harder nature of the alloyed gold being better adapted for the pin. They were refused until the proper alteration was made. In the boxes at the back of brooches and pendants, the same strictness is observed, and a great many of them are jointed or made so as to open, that the jewel may be proved to be of genuine metal.

Another advantage in the large use of 18-carat gold is the better colour obtained on the work. The best Viennese gold jewellery in this respect is very superior, having a soft, smooth, dead surface, with what we term a "satin bloom;" not a speckled granular ground like that some "colourers" produce accidentally in trying to obtain a dead frosted appearance, nor the light bright polish common to the cheap English jewellery. The excellence of colour is to a large extent entirely due to the better quality of gold; the action of the acids and salts used in the colouring not affecting the surface of the better quality gold to the same extent as the inferior. Of course, as is well known, the process of colouring gold is to decompose the gold and its alloys; this process is only continued long enough to dissolve the alloys (silver and copper), thus leaving a film of pure gold on the surface of the article. The better the quality of gold the less the surface is destroyed; 14-carat gold is about the lowest quality of alloyed gold upon which a good colour is obtainable, but in England a large quantity of jewellery is coloured of a much lower quality.

The forms and shapes of the Viennese jewellery were very varied, but the majority of the pieces had a combination of bright and coloured gold; the bright parts worked in small lines of relief, as in the centre of a brooch or bracelet, these being the highest parts; coming from under it all round there is a thin plate of bright gold, showing a line about one-sixteenth of an inch wide, and towards the edge of the article this is repeated again.

Another form used in connection with the bright lines of relief was a brooch or bracelet with different outline, say of a conventional leaf or flower; this had a centre-piece of corresponding shape, but about one-sixteenth of an inch less all round, leaving a narrow, square-shaped groove, the bottom of which was a bright burnished plate, as shown in Fig. 40. (These sketches may not be accurate in every particular, as they are done from memory, the authorities of the Exhibition forbidding very strictly any sketching, and in some instances the exhibitors objecting to taking notes.)

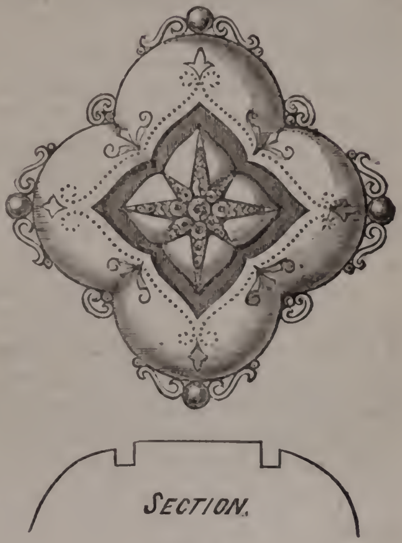


Fig. 40.

Another kind of ornamentation largely taken advantage of was ribbon and strap work, lying over a plain gold ground, saw-pierced into fine scrolls and figures, and carved into shape on the front; this had a very rich appearance, being edged so as to throw the perforated part a slight distance from the gold plate underneath. A great quantity of this kind of ornament was introduced in broad bangle bracelets of from one to two inches wide. Respecting these bracelets, the bangle is the universal form, very few flat bracelets being shown at all; this is owing in a measure to the more speedy method of manufacture than we have. Some bangle bracelets were exhibited in the rough unfinished state, which showed the front and edges to be formed in one piece by machinery, leaving only the lining to be put in to complete the form. In the way of enamel there were some marvellous things, not so much for beauty as for size. Some broad bangle bracelets, lined and two inches wide, were covered all round, back and front, with enamel of black and turquoise colour. In some of these on the front was a large spray of flowers set with small rose diamonds and pearls, flush with the enamel. Also some large lockets, three inches long, treated in a similar manner; these were not coloured, but 18-carat gold polished bright, thereby avoiding the risk of breaking the enamel by the great heat necessary in colouring. Some enamel jewellery of an Eastern type was also exhibited, the surfaces dotted with bits of different coloured opaque enamels, not cut in, but laid on, and looking very patchy and without any evident design; rather showy looking, much like a field of wild flowers, and without any better arrangement. Another class of jewellery illustrated was the red garnet worked up into all kinds of articles, in the old style of red gold, with the cut-down setting. In these there was not much novelty. The same kind of mounting was adopted in rings, i.e. the garnets rising tier above tier; also the star and leaf forms, in the close-set style. In some of the articles great relief was given to its usual monotonous character by the introduction of pearls and turquoise to form the centres of flowers, and beads and bands to join ornamental rows of garnets; this gave life and freedom to what otherwise is a very rigid style.

In the high-class jewellery, composed principally of precious stones, there was a great display, very large opals predominating. A great number of these are found in the Austrian dominions. One very large opal (oval in form) was mounted as a bracelet, and used as a tiara ornament alternatively; this was made to do double duty, by having the bracelet made of open work, many-jointed, and very narrow; when closed it fitted the wrist, when open it encircled the brow. The stone had an apparent division across the centre from top to bottom, one part being of a milky white, the other full of fire and colour, shading towards the edge into a fine azure blue. This was mounted so that the more opaque part formed the bottom, the lighter and

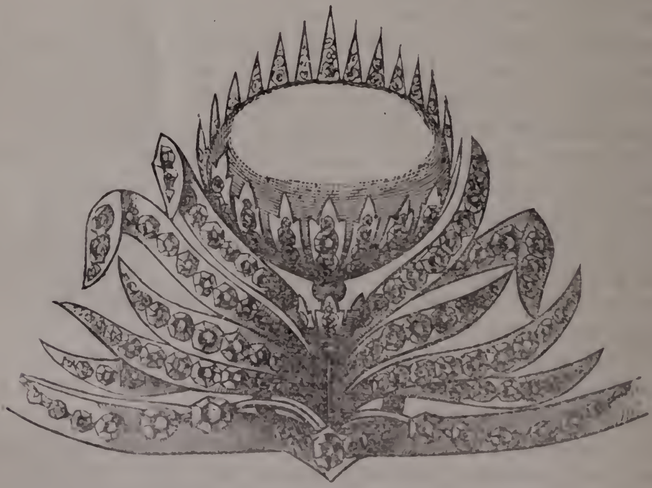


Fig. 41

more transparent part the top, from which sprang a number of rays set with brilliants, conveying the impression of rays of light emanating from the stone. (Fig. 41 is a rough sketch from memory.)

In the same case was a fine light spray of flowers, composed of diamonds and turquoise; the turquoise gave a very beautiful appearance, being formed into a "forget-me-not" kind of flower. The turquoise are just in sufficient quantity without giving "the spray" an overpowering mass of colour, like many similar things in other exhibits. It is very seldom that turquoise are seen in such ornaments; but in combination with diamonds this treatment proved very effective, and produced a very fine article at a comparatively low cost. There was, also, an emerald necklace of very great beauty, with ornamental connecting parts, set with diamonds, brilliants also surrounding the emeralds. In another case was a large spray of flowers, with long grass-like leaves combining, set with diamonds in the leaves; rubies and emeralds formed the flowers. This was surmounted by birds set all over with small gems, consisting of diamonds, emeralds, rubies, and sapphires in very beautiful harmony. The design of this spray was very light and graceful. Some large emeralds and sapphires were cut in the convex form (tallow cut), and used for the centre of flowers, where they impressed less with their beauty than their value. One brooch had a very good appearance, having a large emerald centre, surrounded by chaste ornaments, set with brilliants, from which depended an emerald drop, looped up by a festoon in the form of a light cord set with diamonds, connected in parts and to the brooch by small emerald studs. There was a very good tiara composed of a spray of flowers mingled with ears of wheat and grass, the flowers and leaves being made of silver, the wheat of gold, and the whole set with diamonds.

But the most chaste and finished articles were in the case of F. Hartung; they were not the largest or most costly, but every article in it was excellent, and displayed to great advantage. Plenty of space was given to each article. The case was lined with dark purple velvet. There were no very large stones, but what there were, were of first quality. No massive pieces of jewellery were exhibited in this case, but in brooches, bracelets, earrings, and other ornaments there was a very close attention to small details, and very great perfection in finish. Among other special articles of jewellery a nearly naturalistic representation of a dragon-fly, the thin body of which was set so close as to resemble almost one stone, covered with miniature facets;

the wings set with diamonds, and yet altogether devoid of the heavy appearance usually attaching to diamond work. Some fine onyx cameos were also mounted on a light open spray, set with diamonds falling round it, the stones having no bezel or apparent attachment, yet the leaves were so arranged that by touching the stone in different parts they afforded a firm setting for it.

A brooch with large sapphire centre, and an ornamental diamond border surrounding it, forming the outside rim of the brooch, the space between the border and the stone filled in with an open piercing of scrolls, very fine, in red gold, and set with rose diamonds, had a very chaste and beautiful appearance.

There were several other articles that well merit description; in the whole of them the arrangement of the stones and the setting was of excellent quality; the gold cut away clean and clear from the stone; and the stones were so arranged that the whole space was filled up; no spare gold to be seen but what was thoroughly necessary; the grains rounded, clear, and bright, like miniature burnished beads.

In most of the other exhibits there was great room for improvement, spare spaces being left in an unfinished state. In looking at the under parts of some valuable tiaras worth several hundreds of pounds each, the file marks were plainly visible, and in the arrangement of the stones there was the same want of care and attention. In the matter of pearls there is extreme difficulty in getting several alike, especially in very large ones, and this seems to have been recognised in the Austrian collection, for no attempt is apparent to remedy this difficulty; in some exceptional instances attempts have been made to secure similarity, but not successfully. In diamonds, also, there are many shades of colour; and without proper combinations good intention is frustrated, as is seen in several examples of very costly works.

The whole collection of Austria was very impressive, not only, as already indicated, by examples of taste and beautiful design and specimens of very excellently finished workmanship, but also by the great display of wealth in the possession of such rich and valuable gems in such an abundance.

GERMAN JEWELLERY.

The German collection in general character was very similar to the Austrian, but not so large, nor exhibiting such costly gems. The greater part was good coloured gold work of very excellent quality and finish. The colour in some of the exhibits was remarkably clear and fine, of a very soft dead colour. Most of the work appears to be stamped in dies; and this, with the truly novel and excellent designs adopted, enables them to produce a bold vigorous-looking article at a much smaller cost than if wholly made up by hand. Most of the articles have great simplicity about them; the idea is very apparent and well wrought out. There is a very similar use made of bright lines of relief as has been already described as noticeable in the Austrian jewellery.

Some bracelets made up of tablets were exhibited, that is square or other shaped pieces jointed together. The forms used were chiefly square or octagonal, forming when united together a handsome and massive-looking bracelet. These were well made and fitted together, the joints being kept well out of sight.

Among the enamelled exhibits were some antique crosses, inlaid with different colours of enamel, applied in various designs; on some were mediæval heads and figures of a different character. Also some specimens of translucent enamel on butterflies, small solitaires, and studs of very brilliant colour. There was a novelty, or what appeared to me a novelty, in some thimbles of gold and silver; there were introduced, as substitutes for the usual metal tips, pieces of agate and amethyst, cut to the shape and set in, having small holes drilled in the stone similar to those in the ordinary thimble. These stone-set examples united beauty and durability.

French Jewellery.

The French collection had the peculiarity of the predominance of bright red gold, worked into shapes and styles quite different to the old red gold articles; they were for the most part thin wiry looking ornaments, arranged into a pretty-looking form, interspersed in parts with coloured gold, but had a frail and tinselly appearance; all these ornaments are produced in dies and sold to the French jewellers by eminent firms, who cultivate this branch of trade as their exclusive business. One firm of the name of Decaux exhibited these "blanks" in the rough, as they leave the dies, and very beautiful things they produce; these are purchased at a small percentage above the cost of the gold, by the smaller jewellers, who put them together, and produce a pretty article at a cheap rate. There is among the French jewellers a constant effort after originality, a straining to bring out something new; in doing so they are aided by the natural artistic genius they possess in a very high degree, enabling them to set aside precedent and past historic models of art, to attempt to create or create a style for themselves, and thus they show a greater boldness in working out an idea than Englishmen. Many of the exhibits were of a different character, the designers referring to antiquity for their inspiration; chaste and classical examples of jewellery in the antique style, as brooches, earrings, and bracelets, demonstrated their assimilative power and genius: some of these were worked out by having a coloured gold ground, with oxydised figures thrown up in relief upon it; others, in the Renaissance style, were well carried out in different coloured gold in combination with platinum. These had a much more subdued and refined appearance than most of the exhibits.

There were also several splendid specimens of diamond work remarkable for purity of the stone, lightness of construction, and elegance of design, apparently perfect in finish, and very superior examples of setting.

The French cases also contained some very good ladies' chains, in the style known among us as the Albert. Many of these had a neat brooch-like ornament to fasten on the breast, from which hung two or three bits of chain, with small tassel-ends, the other part of the chain reaching from the brooch to the watch, ornamented at intervals with small gold studs of various designs.

In the way of châtelaines there were several examples in oxydised silver, very large, and artistically made, most of them from the stampings in imitation of leaves and flowers.

DANISH JEWELLERY.

In treating of Danish jewellery, the chief productions noticed will be those exhibited by Christesen, of Copenhagen, whose works were chiefly all of coloured gold; without the adventitious aid of enamels or precious stones, he contrived to make some very chaste and beautiful examples of jewellery, in a style as unique as it was excellent. The principal material used in ornamentation was gold wire, either plain or twisted, but totally different in style to the Italian. The brooches were frequently of a circular lunette shape, which formed the ground of the wirework, not in all examples soldered close to the surface, but allowed to twine and entwine into interlaced patterns, after a modified Scandinavian type. Other examples had the wires soldered two and three together, worked in similar style, or the patterns thus arranged simply attached to a rim, leaving all the delicate tracery in relief, like perforated lace. In lockets, while

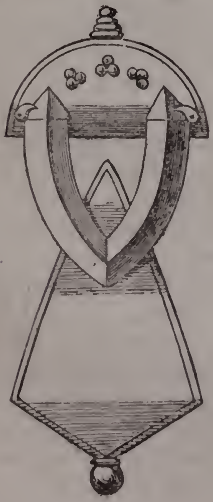


Fig. 42.

some were plain oval forms, ornamented with minute rings or parts of rings and scrolls, in very fine wire, worked from the centre in some rosette form, the surface of a dead yellow colour; others had the letter S worked in wire in a very artistic manner, entwined with scrolls and graduated beads as terminations. There was a revival of the old Scandinavian forms, notably in the Fore (a kind of ancient brooch); these were all in dead gold, and also overlaid with wirework. Fig. 42 is an illustration of the form.

In bracelets there were evidences of a similar revival, the hoop being a half-round with the ends passing each other on the front, with a thick and ornamental rounded termination, the two parts passing belted together with a small Gothic-shaped band. The colour given to these things was a dead yellow, not so soft and smooth as that of the German jewellery, but, more like the Italian, is well adapted for that kind of work to give the fine strands of wire their proper relief. The workmanship on all appeared very good; the fine wires were cleanly soldered; all parts of the various articles appeared to be finished with great neatness and delicacy.

ENGLISH JEWELLERY.

The English jewellery was represented by two jewellers from London and one from Edinburgh. Though not giving a fair representation of English-made jewellery, yet the little exported left no room for reproach.

The exhibit from Edinburgh comprised a large collection of Scotch, and articles designed in the Celtic style, of very pure design and excellent workmanship; the nature of the design left not much room for display, the stiffness and inflexibility of the "types" selected preventing any comparison with foreign work. Yet, not unfrequently, the stiffness in the designs was toned down by an intelligent arrangement of suitable enamels, a free introduction of the Scotch pearls, or the introduction of the characteristic pebble and agate work for which the Scotch jewellers are celebrated, the metal work of which is made chiefly from dies, the apertures for the reception of the stones being pierced out by press tools, the stones cut to fit the spaces afterwards, and fixed in with cement. There were crosses of the old "revived" Celtic character very beautifully executed, and others in which the "cairngorm" (a dark gloomy-looking crystal) was secured in a plain "claw" setting with very little gold visible; also brooches and earrings of modernised "Celtic" design, preserving the principles and spirit of the older examples; but with modifications and different arrangements, distinguished by the characteristic names, as the "Queen Mary," or "the Lorne," which enhance their attractiveness to Scottish maidens; all were examples of skilful handicraft and well finished.

The chief exhibit from England was by Hancock, of London, whose *chefs-d'œuvre* were the jewels of the Countess of Dudley; these for value, artistic arrangement, and skilful workmanship, were unsurpassed in the Exhibition. These having been often already described, I need not further allude to them, beyond saying, the stones forming the several suites were in exquisite harmony with each other in colour and size, each and all set with truth (that is the flat table of the stones of equal height in the setting), and the gold surroundings cut with clearness and precision, the grains being thrown up in beautiful form, and the most minute parts treated with delicacy and care, the whole evidencing great skill alike in design and execution.

In the ordinary class of jewellery there was not anything striking or novel. In some of the goods there was a peculiar use made of enamel (of the champ levé variety) a small cluster of enamels laid on, in conjunction with precious stones, for a ground to receive another colour painted on that, either a little star or small dots. The colours introduced were generally of a subdued character; for example, in a pendant and earrings, with gems of pink hue, pearls, diamonds, and emeralds, the enamel was blue ground with white dots, or white ground with blue dots. In another pendant and earrings, *en suite*, with centres of "moonstones," further embellished with diamonds and rubies, the ground of the enamel was black with blue dots, and a pale blue ground with dark blue dots. A cross made up of exquisitely "saw-pierced" metal, with a brilliant gem-set star-centre, from which "rays of light emanated; the termination of the ends of the cross were set with diamonds and pearls. A number of suites of jewellery and bracelets were also included in the display of this exhibitor; the ornamentation derived from Egyptian and Assyrian decoration, the former appropriately decorated with subjects in enamel, the latter with figures produced by "repoussé" and executed in very full relief. The enamelling was of the opaque kind used by the Egyptian jewellers of old. The characteristics of ancient Egyptian and Assyrian ornament were faithfully preserved. Examples of gem-set bracelets, very narrow, the gems set in straight lines, exhibited the quality of the gems and the skill of the setter; other examples were made of all gold, as necklets, after Greek and Roman "*motifs*," the joints producing flexibility completely hidden at the back. Some Swiss enamels, with mounts, i.e. wreaths of flowers executed in coloured gold, i.e. green gold leaves, entwined with ribbon of yellow gold, an example surmounted with the bow and arrow of Cupid was very tastily arranged. The whole collection of Hancock indicated very high-class taste and workmanship, though in the artistic treatment of the materials there was not the freedom, originality, and lightness which characterised the French and German exhibits.

Respecting the conditions attaching to the production of jewellery in Austria, we found they were different to our own. The manufacturing jewellers are mostly in a small way of business, and employ but few hands; some of them are supplied by shopkeepers with gold and stones to work up into different articles; others, while working at their own homes, are exclusively employed by one shopkeeper, working for him alone. Other retail jewellers, who cannot afford this, are supplied by a workman who works generally for the trade, and they cannot command one article exclusively for themselves, as the wealthier retailers in a larger way of business pride themselves upon doing. There is to a certain extent the same division of labour; as, for instance, the workman, when he has finished making an article, takes it back to his employer, who sends it out again to the "setter." There are men who practise exclusively only enamelling, others engraving. One important difference has already been hinted at—the workman coming directly in contact with the retailer. There appear to be no "middle men," or factors, who receive the goods from the manufacturer and sell them to the shopkeepers. This accounts for the smallness of the Austrian manufacturing businesses, and in some measure for the cheapness of their (or foreign) jewellery over that of England.

SPECIAL TECHNIC INSTITUTION.

The advantages foreign workmen possess over ours are owing to the existence of technical schools, where their children and youths are taught the various branches of science bearing upon practical industries, irrespective of the particular branch of trade they may in future pursue; so that in coming to any particular trade there is the basis of knowledge brought, that the exigences of business may develop into something eminently practical and useful. For I conceive it to be one of the fallacies of technical education that instruction should be given only in those particular departments of science and art directly connected with certain businesses; for if a wider ground is covered, and science in general taught, art included, particular industries may find a new development, a fresh channel for expansion, by the application of facts and knowledge gathered in the more extended course of study indicated by me. Changes and improvements may thus be effected, and greater perfection attained in the special branch of the industry or trade selected by the workman, on the practice of which he depends. Another advantage is, each workman is thrown more upon his own resources; he will be more self-reliant for design—not as with us, this being left to the employer, or to some one skilled in the profession of designer, thus withholding the motive and incentive to effort in that direction. With the foreign workman there is every inducement to educate himself for this purpose, knowing without it half his chance of livelihood is gone. By constant practice and habit the faculty for design is quickened and developed; depending on employer or designer alone, the talent for design, or ability to design, might remain dormant and idle. If, then, there is a reason we should increase the artistic skill of our country, and I think there is, the Vienna Exhibition alone furnishes one. It will not be done by Government grants, though they may be very useful, nor by the erection of public schools, though they are very needful, but by giving every facility for the cultivation and the opportunity for the display of artistic taste to each individual; the thorough recognition by each of the advantages of and necessity for personal effort, and an honest, earnest, united endeavour on the part of employers and employed to work out the result.

Metallic Tubing, Rolled Metal, &c.

By JAMES GRICE, *Practical Tube Maker, Associated Reporter, Birmingham.*

SPEAKING generally of this class of manufactures exhibited in the Vienna Exhibition of 1873, I am decidedly of opinion that the foreign productions (with the exception of one particular instance to be presently noticed) are in no way superior to what is produced in England, the town of Birmingham especially.

In most cases (France excepted) there is a want of finish about the work, which, while it has no additional claim to notice as regards solidity or excellency of construction, makes it compare most unfavourably with our own productions. To say the least, the latter claim attention for a full maximum of substantial workmanship, whilst the amount of finish displayed is, in nine cases out of ten, far before that of any foreign house as represented at the Exhibition.

I shall proceed to notice in detail the most noteworthy exhibits.

Notices of Exhibits.

In the stand occupied by Ernest Krackhardt, of Brunn, I found tubes varying from 6 to 12 in. diameter of hammered-up copper and dove-tailed joints. These tubes are exceedingly well made, the joints being neatly made, and well brazed. The drawn "lap" jointed tubes made by this house are also very good; they range in sizes from 1 in. to 4 in. diameter, and are 20 ft. in length. The work produced by this firm ranks amongst the best of any foreign manufactures in the tube-making department. They also largely manufacture work for sugar refining and distillery purposes.

Von Aron Hirsch und Söhn, of Halberstadt, showed a variety of seamless tubes, both in copper and brass. They exhibited also specimens of ordinary sheet metal, and pinion wire for clocks, drawn from $\frac{5}{8}$ in. to $\frac{1}{4}$ in. diameter. They also exhibited a display of copper pans "rose" from sheet copper.

Ferd Dolainski and Co., Wien.—This house exhibited copper-drawn lap-jointed tubes, varying from 1 in. to 4 in. diameter. These tubes are not well made, the joints being imperfect, the tubes not straight, and the surface of the copper rough.

J. Aders, Neustadt, Madenburgh, exhibited a variety of seamless brass tubes, varying from ½ in. to 2½ in. diameter, and 22 ft. long. These tubes are well made, having a smooth surface, and very straight in the finish.

C. Heikmann, Berlin, exhibited ordinary lap-jointed copper tubes, varying from 1¼ in. to 3 in. diameter. There was displayed also a large sheet of copper, 41 ft. 6 in. long, 6 ft. 6 in. wide, by ¼ in. thick, which weighed 1 ton 6 cwt. 2 qrs. 8 lbs. This sheet of copper is exceedingly large, but I could not comprehend the utility of it, still one cannot but pay a tribute to the skill which is evidenced in its production.

In the Belgian Department I found a very good class of lap-jointed iron tubes, but in making they had recourse to rivets to hold together the joints before brazing them ; but on the whole they are a first-class lot of plain tubes, varying from 6 in. to 10 in. diameter and from 13 ft. to 14 ft. long, with wrought-iron flanges on the ends.

I may as well note here that the visitor curious in such matters suffers from want of proper information, there being no one in attendance in this, as in many other instances, to give information respecting the mode of production, character, or the intended application of the exhibits.

D. Molian, Prussia, exhibited a good assortment of rolled metal wire ; he also showed a roll of the thinnest and finest rolled sheet metal that I have seen. It is a first-class specimen of what can be produced in the art of metal-rolling, showing in a pre-eminent degree to what thinness even brass may be brought. The roll in question is as thin as gold-leaf before being beaten, the colour good, the manipulation perfect, the metal free from holes, and, altogether, the roll is a wonderful example of the ductility of this metal.

Prominent among the Austrian houses, I found Messrs. C. H. and H. Chandoir, Wien, exhibited samples of seamless tubes of ordinary make. They also exhibited octagon tubes, seamless, which are very rough, and scratched on the surface. The same description will also apply to their "reeded" and "twisted" tubes. There was also shown a large bar of brass, apparently 4½ in. diameter and 14 ft. long ; also copper coils made of tubes, but of no particular merit. A good assortment of copper pans was also exhibited. They appear to me to have been "rose" by hydraulic pressure, there being sixteen "rose" in a body, or together. There were others of various sizes, as follows:—Thickness, 24-wire gauge, 10 in. diameter, 7 in. deep; 24 in. diameter, 18 in.; 3 ft. diameter, 4 in. deep. They also exhibited good specimens of fine wire-drawing.

Following on the above firm I shall proceed to notice the exhibit of Messrs. Zugmayer and Son, Waldejgon, N.O., who are not exhibitors of tubes at all, but who displayed a large assortment of copper pans, made from the single sheet. Many of these are of very large dimensions, and of first-class workmanship.

But the question naturally arises, as it strongly forced itself on my mind, whether the cost of production in this instance does not exceed that of the old riveted and jointed process, as well as that no advantage arises in other ways. To my mind, the cost of production in separate pieces and riveted must be much the least expensive, as working them out of a single sheet must be both tedious and expensive.

But perhaps, after all, the Austrians possess some secret in brazing, which must be perfect of its kind; it may be that some of their large pans are brazed. All that I can say is, that, if they are, the joints defy the closest scrutiny. I should scarcely think it possible, but mention it as probable.

The perfection of these examples of manufacture cannot be questioned. One of the pans has on it an iron flange.

As a specimen of the copper-rolling capacities of the Austrians, this firm exhibited a sheet of the metal, in length, 17 ft. 7 in.; breadth, 8 ft. 7 in.; weight, 5,229 lbs., or 2 tons 6 cwts. 2 qrs. 21 lbs. Having alluded to the large "coppers," or pans, the following dimensions of three of the largest will not be out of place. One 11 ft. in diameter, 4 ft. deep, weight 13 cwts. 14 lbs.; another 9 ft. 3 in. diameter, 4 ft. 6 in. deep, with iron flange 4 in. wide all round the lip.

I do not think we produce anything equal to these in England; at all events I never saw anything like them. This firm also showed some very good specimens of "tuyere" pipes, or copper pipes for blast furnaces.

Johann Liebig and Co., Niederlange, Wippling.—This firm, also, exhibited some sheet metals of good width, and of about 21-wire gauge. Everything in this exhibit is exceedingly good, and the products equal those of many English houses.

While on the topic of sheet metals, I would notice that many of the foreign productions (in sheet metal) are remarkably clear, free from blemish, and of a peculiar yellow cast of colour, different to that of English manufacture.

Carl Klein, Obewesterreich, exhibited a capital variety of sheet metal, also brass and copper rods, some of the latter up to $1\frac{3}{4}$ in. diameter, and rods 2 in. square. The castings exhibited by this firm are also most noteworthy for clearness, sharpness of outline, and freedom from "sand holes."

We now come to the French houses. Most prominent amongst them stands Messrs. J. J. Lavoissière et Fils, Paris. This is the firm I alluded to in my introductory remarks as furnishing an exception to the general quality of the workmanship displayed at the Vienna Exhibition. They have a grand display of tubes, built up in the shape of a square tower, with a turret at four angles, and a passage in it which visitors passed through, and examined their display. The tubes are all seamless, of all sizes, varying from about $\frac{3}{8}$ in. to 17 in. diameter, and from 10 ft. to 20 ft. long. The 17-in. diameter tube was over 20 ft. in length, and is in itself a splendid example of what may be effected in this particular branch of manufactures. Perhaps the great majority of tubes exhibited at this stand are from $1\frac{3}{4}$ in. to 6 in. diameter, but, whatever their size, they exhibit a marked excellence as regards manipulation; they are, in fact, perfect specimens of their class—without dents, clear in surface, free from scratches, and straight as arrows. They also showed a class of copper tubes, bulged in the "centres," from $\frac{5}{8}$ in. to $1\frac{1}{2}$ in. diameter; but for what purpose they are required I am unable to conjecture. Tubes of this kind illustrate the fineness and malleability of the metal of which they are made. This firm shows a great superiority over other houses as regards the size of their products, as well as for the quality of their workmanship. They supersede the English tube manufacturers in the former particular, while the skilled labour exhibited in the ordinary sizes bear about the same comparison. It is a first-rate stand of tubes, and these, taken as a whole, are far in advance (as regards diameter) of any seamless tubes we produce.

THE BRITISH SECTION.

This department of the Exhibition allotted to Tube Manufacturers is well represented by Messrs. Winfield and Co., Birmingham; The Broughton Copper Company, Salford, Manchester; and by Messrs. Everitt, Allen and Co., Birmingham, the particular excellence of whose manufactures is so well known. It is sufficient to say, that the firm last mentioned shows a display of seamless boiler tubes, and also ornamental tubes, of various patterns and sizes. They have also a good assortment of wire and rolled metal.

Messrs. Winfield and Co., Cambridge-street, Birmingham, exhibited an excellent class of large-reeded, ornamental, and lap-jointed copper tubes; also brazed gas tubing and ornamented tubes, the ornamentation produced by means of steel wheels, on the periphery of which the design to be impressed on the tube is sunk by a die-sinker. Of this variety of tubes the firm named exhibits a great variety of patterns. It is, however, to be regretted, that the majority of the tubes were shown as dipped or passed through aquafortis, and therefore did not show the skin on the metal as it left the drawing-tool; an injustice to these exhibitors (inflicted by themselves), whose tubes enjoy a deserved reputation for quality and finish.

Messrs. Collings and Wallis, of King Edward's Road, Birmingham, had a nice collection of goods in their display of English ironmongery. Among others a selection of ornamental tubes, manufactured by Messrs. Grice, Grice, and Booth, of Birmingham.

The Broughton Company exhibited a class of tubes of various descriptions—locomotive boiler tubes, and lapped-jointed copper tubes; also tubes for calico-printing rollers. Their lap-jointed copper tubes are exceedingly good specimens of British workmanship in this class of manufacture; and, taking it altogether, their display is creditable to English manufacture.

Whitley and Partners, Leeds, exhibited a good display of lap-jointed copper tubes, seamless boiler tubes, and brazed gas tubes. Their gas tubes in brass are rough on the surface, and appear as if they had been sand-papered; a very objectionable proceeding, as it does not show the proper surface of the metal; but, taking them as a whole, they are very creditable.

In concluding these remarks, I would observe that there is nothing in the French department of this class of manufacture at all pretending to anything of a fancy character or description. As for gas tubes, I cannot find one exhibit against England.

The superiority of France consists in her large seamless tubes. In the ordinary sizes there is nothing special.

There is nothing particularly noteworthy in the Austrian and Belgian Departments beyond what I have mentioned in the foregoing Report. The workmanship is, in many instances, of an ordinary description; in fact, I have every reason to think that many of their best exhibited specimens of lap-jointed copper tubes are the produce of British industry and skill; they so closely resemble our own make, that no English maker could tell the difference.

In the ornamental and fancy tube department England still maintains her superiority of workmanship, when compared with other countries, both for gas, chandelier, and brass foundery, and other purposes.

Bells.

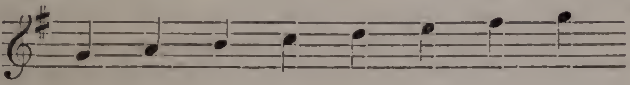
By JOHN BANISTER, *Bell Tuner (Messrs. W. Blews and Sons, Birmingham).*

HAVING been requested to report upon bells exhibited at the Vienna Exhibition, I beg to state—as well as my ability will allow me—what I saw, and my opinion thereon.

The largest bells I examined were exhibited by Von Janaz Hibzer und Söhn, Wiener, Newstadt. They were eight in number, the largest weighing about four tons, the smallest about four cwt. They were not intended to harmonise with each other, as they had not been tuned, but to be used as single bells placed in a tower where only one is required. The middle size I considered to be of the usual quality of tone, but the two extremes I did not approve, the largest being unnecessarily heavy, the smallest being too small to produce a pleasant sound. A bell weighing, according to my judgment, three tons is equally as good, and sometimes better, than one weighing four tons, and therefore one ton of metal is saved. Again, I consider no church bell should weigh less than from five to six cwt. to produce a sweet tone. The same firm exhibited two other bells much shorter (not so deep, squatter) than those I have mentioned. If an experiment, they are, in my opinion, a failure, the tone being much inferior to others of ordinary shape or proportion.

The next I examined was a peal, nine in number, placed in a frame erected for the purpose. The exhibitor's name was not shown. They had been tuned (that is why they are called a peal) for the purpose of playing tunes; a finger-board, fitted with keys connected, and attached to wires leading to the clappers, allowed them to be played similar to a pianoforte. The key-board being locked up, I could not test them ; I judged them to be of the ordinary quality, the largest weighing about two and a half tons, in the key of B flat.

I next examined four exhibited by Von Albert, Samassa, in Laibach ; they were rung by a number of men every day, at 12 at noon, and 6.30 in the evening. The largest weighs about two tons, the smallest about three cwt., which I believe to be too small; for this reason: it would not be heard one-half the distance the large one would. By making it larger in diameter, and thicker, it would produce the same note, be heard at a greater distance, and be more musical. The largest I believe to be good. The notes are as follows:—

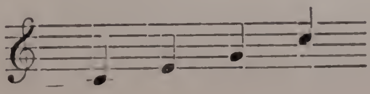


They were rung by means of a rope attached to a lever fastened to the stock the bell is suspended from.

As all the others I inspected were a *fac simile* of those I have mentioned—except a bell made of steel I will speak of presently—I will conclude my remarks upon foreign bells, and will add all the castings were very good; they are much decorated and polished, but that I think almost useless, as they are generally placed in a closed tower, and very rarely seen again; they soon become covered with dust, which hides the decorations.

The steel bell just mentioned weighed about four tons; its note was intended to be A flat, but it had other sounds almost as loud, which caused it to be unpleasant, as these did not chord well with the natural note. But to my judgment, cast-steel bells, although only recently manufactured, are a failure; for two reasons: their tone is inferior to the bell-metal bell; again, in a short time, in consequence of the material not being so dense as ordinary bell metal, they are far more susceptible of oxydation, which, in falling off, must eventually alter the tone. This is not of much consequence if a single bell, but if a set of tuned bells, it would be of great consequence.

The only English bells I could find was a peal weighing in all about three tons, exhibited by Messrs. Blews and Sons, of Birmingham, and hung in a frame about 30 ft. high. When in a tower, they will have wheels attached to the stocks, and ropes attached to the wheels, exactly the same as are used in English churches. They can be rung for joyful occasions, chimed for church service, or used for tune playing, or playing the clock quarters, such as the Westminster chimes. The notes are as follows:—



Messrs. Blews and Sons also exhibit in the English Department of the Industrial Hall a peal of fifteen musical hand-bells. They are tuned and polished; are two octaves in the key of C. Such bells are, of course, well known in England, but they seem to attract much attention in the Vienna Exhibition; many persons make inquiries what they are used for. It is almost unnecessary to say they are for playing tunes with, either by hanging them up and tapping them with a leather hammer, or three or four men can hold them in their hands and strike the clapper against the bell.

In conclusion, my humble opinion is, no improvement has been made in the manufacture of bells for two centuries, except the castings are better, and very little improvement in hanging them. There are bells used now a century and a half old, as good as they are made at the present time.

Cabinet and General Brass Foundery.

By GEORGE CASHMORE, *Brass Founders' Pattern Maker*
(*Messrs. James Collins and Son, Birmingham.*)

THE following Report is the result of careful observation and deliberate conviction as to the comparative merits of the contents of the various cases of brass foundery exhibited by the several countries in the Vienna Exhibition, with the same or a similar class of articles produced by the best Birmingham manufacturers of brass foundery.

AUSTRIAN BRASS FOUNDERY.

In examining the various articles, my attention was arrested by the very great number of lock handles for doors, in the Austrian and other courts, of a different form to those made and used in England (viz. the ordinary door knob), which with us are generally round and smooth, the worst possible form to overcome any friction when the lock does not work freely. The handles which I allude to, so generally in use in Vienna, are of a cranked or bent form, the leverage or increase of power which can be applied to the cranked handle (over the knob) being very much greater, demonstrating its superiority; it also admits of an opportunity for the display of ornament, which the knob form cannot. The handle is, in form, simply a crank or right angular piece of metal, the short leg of which is fitted on to the lock spindle, the longer leg or lever to which the pressure of the hand is applied, by which the bolt of the lock or latch is turned, being from 3 in. to 4 in. long. The rose and escutcheon plates are united in one piece, outline ornamental and surface plain. The castings were good clear work, free from specks and sand-holes; the finish (either burnished or polished) was of good quality.

Other examples of a superior quality, more bold and massive, were ornamental, the design and ornamentation generally being such as not to render the cranked handle unpleasant for grasping; this principle is carried out in very much of their work with success. The style of ornament most prevalent in this variety was a free treatment of foliage after the Renaissance style. Some of the best ornamental work was well got up in the various bronzes of steel and copper colour, some being bright dipped, lacquered gold colour, and finished in good workmanlike style.

Of door handles there were some few of the recognised English form, but not of that profusion as in the other kind already alluded to, the arms and plates being plain and polished; very little ornamental skill shown in those exhibited. But there are examples of art workmanship, consisting of timepieces, stands, and vases. Some were finished in a different style, accomplished in the following manner: the casting patterns are all left quite plain, smooth from the rifling, no matting being put on them; castings from the pattern would therefore be smooth, and after being fitted and polished are dipped bright; then, with a brass wire brush revolving in a lathe, scratched over the whole surface: the effect of this kind of finish is very brilliant. Others were scratched only, and have a film of gold deposited on the surface. What examples there were of both kinds of finish were good examples of art workmanship. The cabinet and general brass-foundery of Birmingham would be improved (especially as regards its sale in Continental markets) if the style of finish alluded to were more generally adopted.

Of hinges exhibited, those known to the trade as the "heave off" preponderated, being used for the kind of windows known as French casements, for the convenience of cleaning them when required, some of the largest and best being about 10 in. long, with ornamental joints of about 1 in. diameter, with knobs to match at top and bottom. The flaps were long and of bracket-like shape, and covered with tastefully modelled scroll-work, cast in bronze, dipped bright: a very good hinge, its only weakness being the pin, which was too small in proportion to the size of the hinge joint. A great quantity of the hinges exhibited were in iron, the joint and flap covered with a thin case or covering of brass. Some with knobs looked like good work, the brass being even upon the surface and polished; others also of the same class of article, but not of such good workmanship. The expense of fixing the brass upon the iron would add somewhat to the cost; nevertheless I think it worth the consideration of manufacturers of hinges whether an article to come between the iron hinge and the "all brass" could be produced, which would last much longer than the cheap brass hinges of Birmingham make.

As regards espagnolette bolts or fasteners, there was not a very great or artistic display. In finish they were very fair work (as far as could be seen without handling, which was not permitted as a rule; there were, however, some exceptions, and the most had to be made of such opportunities when they presented themselves). There are three varieties of espagnolette bolts. One variety fastens with a hook top and bottom of an iron rod the length of the door, the bolt being held in its place by screws. Some were plain, others ornamental, with a handle to match fixed to the bolt, which on being turned to the right or left unfastens or fastens a window. A second variety works by a turn of a knob or handle, which shoots a bolt into socket plates fixed in the window-sills top and bottom. A third variety is composed of three bolts, shooting out top and bottom, and another which shoots from the centre. In some of the espagnolette bolts locks are added, the box part being made larger for this purpose; or a three-tumbler lock, apparently similar to Chubb's (the lock construction not being displayed, the exact motion cannot be described). The kinds first alluded to are by no means new to Birmingham, the locking motion excepted. Ours, with having two motions, are more simple, consisting of a bell crank lever (instead of the disc), to each end of which is jointed the bolt shoot, the knob being fixed to the centre of the lever to give motion to the bolts; the other, made here, having three motions, being more complicated, consists of three racks formed at the ends of the bolts gearing into a pinion wheel, one on each side for the top and bottom motion, and another along the bottom of the pinion for the centre bolt.

Of other kinds of brass bolts, as sunk "slide," none were exhibited; but in a case of iron bolts are some for a similar purpose; being rather different in the sunk part to those we make, a greater amount of wood will have to be cut away to fit one of these bolts upon a door, almost ¼ of an inch more than the sunk slide bolt we make for the same purpose.

Of staple bolts for cupboards, there were some few examples with brass, and others with iron shoots, very indifferently finished, being sanded, and deviation from the English bolt used for the same purpose.

Of sconces, those exhibited were plain and ornamental, some of them rather inferior, both in point of design and finish, the dead dipped examples not being a good colour, the few jointed ones having no new feature; the branch or scroll sconces moving in a small socket are not modelled artistically. Of the few I saw the castings were by no means good.

In castors there was a better variety and quality, the "cabriole" being the most numerous; the frill castor, the greatest number of which had a "frilling" of $\frac{1}{4}$-in. beads or dots, with plain edges on each side of about $\frac{1}{8}$ of an inch, "dead dipped" and burnished over the beads, the edges being used for an ornament to the top of the castor socket, exactly like one in use with us, The socket castors were of a fair quality, both round and square, but rather light, both dead dipped and polished, and of similar quality of workmanship to the previous ones already alluded to. Of more bold and substantial socket castors, the best were fitted upon the pianofortes. These castors had good bold sockets, some of which were rather too straight to harmonise with the taper of the legs of the pianoforte; in finish they were dipped and burnished, had good massive wheels, but in some examples the pins to attach the horn to the socket appeared too small in proportion to the size of the castor, the same rule applying to the pin on which the wheel revolves in the horn. Pivot castors also: the iron plate, or pivot, to which the horn which carries the bowl is attached by the pin is similar also in shape to ours, the finish of these castors being of very fair quality; the horn and wheel were brass. Another variety very numerous, the cabriole, but having a spike (instead of a screw, as with us), is more easily fixed, but more liable to become loose, or disconnected from the work they are intended to assist in moving.

In pianoforte handles, the examples being fixed upon the "fortes," for convenience of moving if required, there were three varieties of forms, most of them ornamental: some like the box handle, with a square stop at the top, the handle working in a projecting part on the plate against which the stop acts; the length about four or five inches; rather strong and substantial work. Others of the same form as a cash-box handle, but as bold and strong as the above examples. Another variety was of the same form as a modern drawer handle (much in use here), but larger; about the same length as the others, but raised up in a curved form, of sufficient height for introducing the fingers when required; projecting about one inch by two inches wide; fixed with screws, one on each side, and one on the top; foliage modelled over the surface in a similar style to the lock handles already described, but not of such good quality; the style of finish, dead dipping, and burnishing of fair quality.

Of bell pulls and centre knobs, the greater number being plain round sunk pulls, of like shape to those we use, there was very little diversity in their design, and nothing very novel; a fair quantity of plain round sunk pulls with a flange rather broader than with us, the sunk part flat at the bottom, not cup-shaped.

These were the most numerous, and, generally polished, were good-looking pulls, and well finished ; some more so than others. Others were of a common quality, a flat plate nearly oblong. Some were oval, with a round knob ; these were generally burnished. Of pendent pulls there was no great variety. In this particular pull there is scope for an infinite variety of design. The main features of this pull consist of one or more plates with standards, through which the slide works ; stops are introduced to regulate the length of the pull ; attached to the rod is the handle, of which we have a great variety of patterns. All the examples exhibited were polished, the quality of the work being varied as those previously alluded to. Of centre door knobs there was a good display, plain, polished, and ornamental, also finished in various tints or colours of bronze (like the lock handles and ornamental hinges). The style of ornament on the latter was somewhat similar, and, as examples of art workmanship, much better than the bell pulls. Many of these door knobs are rather more pointed than is usual with us, which, being a deviation, gives character to the knob. Whether plain or ornamental, a few of the examples of each were of first-class workmanship.

Of drawer handles there were a considerable quantity, one of the varieties of which was the old familiar lion's head and ring, in a great variety of sizes, ranging from one to three inches in diameter, finished in the usual style ; the dead dipping of the head was not well done, neither was the burnishing of the ring. Of other forms of drawer handles there are a few of the "drop" class, jointed to a small clasp, with shank to fix it by passing it through a small plate of a rather fanciful form—it is very like an article made here for a similar purpose ;—these were polished, and of very fair workmanship. Another article for the same purpose, also similar to one of our patterns, being the ring handle—the section being square, chamfered edge, jointed to a small knob, with shank for fixing to a plate similar to the previous one, also polished, was very fair work. The last variety was the same as our ogee, a very common handle, various sizes, of bent shape, or curved and fitted to a small knob and rose of ogee shape, not well finished in the burnishing, the quality of finish not being equal to the usual style of finish.

The great majority of the cabinet brass foundery was of common quality, consisting of plain burnished lifting handles, with stops, being of the usual shape, and working in knobs cast on the plate (in oval form). The other variety was similar to the above curved-shaped handle without stops, there being a projecting bit on the knob for the handle to stop against; the handles were finished as those alluded to previously.

In flush handles there were a fair quantity, but common finished "sanded" fronts, with burnished handle. Of the better class of dead dipped ones I saw none of new form, there being only the oblong frame containing a handle of the same shape, some of which were a fair quality of work; other examples of the same kind, but workmanship inferior.

Cash-box handles were also shown, the quality of the same being equal to the flush handles, the dipping not good, no new variety observable.

Some very good examples of ornamental escutcheons, with and without covers, some of which are modelled in the shape of a scroll shield, of excellent form and good workmanship, some of which were bronzed copper colour or black; these were of as good quality as the handles. A quantity of patterns of plain oval polished and thread escutcheons for inlaying in wood were exhibited, both examples very common work.

There was a variety of brass work we do not manufacture exhibited, such as box irons, made in brass, larger and deeper, admitting of their receiving a larger heater, which retains the heat longer; the heater is kept in its place by means of a sliding door; there were a great variety of sizes, some of which were neither particularly flat on the face nor remarkably well polished, but still by no means bad work.

There are a few sash lifts, like those we make, but more common; one on a small angular-shaped plate, with two ears, to which is jointed a flat-shaped lift: it occupies but little space. These lifts are of a very inferior class of finish.

The screw and spectacle pulleys shown, either single or double, are also light, unsubstantial, and very commonly finished. The larger sized spectacle pulleys were better finished and more substantial work.

Of the sash screws exhibited, some were with the oval-shaped head, like ours; others had a crescent-shaped head, but plain grip surface; both examples polished. The next variety had a wrought ring with knob, into which the screw is cast; these were dipped, but are not so good for the purpose intended as those previously alluded to.

Hooks of various kinds. In some of the wardrobe hooks the ornamental varieties had a screw cast in, with a rose to match, which is loose, metal being saved thereby. Another variety, about the same size, i.e., 2½ or 3 in. long, of the same shape, but plain and burnished, the curved part ending with a small knob;

from below, where the screw is cast in, there drops a small hook, giving it the appearance of a little hat-and-coat hook. In cupboard hooks, in the examples of the square hook, the return end is finished with a little ball. The lamp hooks also terminate with a ball at the tip, being very fair examples of "tack work."

Having now exhausted the specialities of Austrian brass foundery, I proceed to notice in the same manner

French Work.

In lock handles there was not so great a display as in the Austrian Court; yet some of those exhibited were very good examples of art work, the bronzes introduced on the examples shown being very good in colour, as also were those "dipped bright."

Of door handles there were an excellent variety, both in point of design and finish, more so than those of Austria or Russia; some of the handles of a good useful kind, used sometimes to fix upon the centre of the door, like the centre knob with us; the examples of this kind being larger and bolder in every way than the regular English door handle. They were both straight and bent gripes, cast, and of tube, the roses, standards, and gripes modelled in good bold forms, in same style as the lock handles, and finished in the various colours of bronze and gold of first-rate quality.

The chief features of this court are the examples of high art, shown in a great variety of brass work for ornamental and decorative purposes, as vases, large and small stands, timepieces, and balustrades of good design, in the Italian style, bronzed, black, and copper coloured, others finished bright, like those of Austria previously described, but a much greater variety of all the styles of finish for which the French are celebrated, and deservedly so.

The examples of hinges with ornamental joints were of good design and workmanship, similar to the work previously named, and of equal merit. Some iron hinges with thin brass cover, or cased like those of Austria, and of the same quality of work, were also shown.

Of espagnolette fasteners and bolts a great amount of artistic ability was displayed on these and other articles which the French exhibit, both bronzed, gilt, and silver plated; some have a well-modelled figure for the handle, the castings have a good clear skin, the finish first-class. Some of these we could copy to advantage in the manufacture of espagnolette fasteners. Some of the best centre knobs are exhibited in this court, varying in size from about $2\frac{3}{4}$ in. upwards. Of the mortice lock knobs and lock plates, the ornamental and plain polished examples, the whole was fair good work.

Of picture rods, brackets, and knobs, there were exhibited a few polished; others were dipped and burnished, their finish of average quality.

Pianoforte sconces, branch, jointed, and with straight stem, plain and polished, were exhibited; one very good is fixed upon a piano, the shield acting as a stop against the plate. The piano handles and socket castors were also good, most of the examples being dipped; the ornamental not such good specimens of art work as the centre knobs and door handles, but very fair work. Hat-and-coat hooks, single and double, plain and ornamental, bronzed and burnished, were also shown, these being good work.

The more common examples of cabinet brass work consisted chiefly of the same class of work as that of Austria, the quality the same, not being very good work. The flush handles, sanded and polished, were neither flat nor good square work, and of very indifferent quality; one of these consisted of a plate of oblong shape, 3 in. by $\frac{3}{4}$ in., the handle jointed at the edge.

In window fittings, consisting of brackets, dipped burnished rods, and lath brackets of similar quality, neither novelty nor variety was apparent.

A few examples of common mortice knobs, plain burnished, and mounts for china knobs, very light work of clear casting, were exhibited, but very commonly finished in the burnishing and lacquering. The whole were prepared by Wilkes's spindle. Of

Russian Work

There was no great display. Some of the brass work upon the pianofortes was of better quality than either Austrian or French. The castors of the pianos harmonise better with the shape of the leg. The pedals of the pianos were of brass, were both plain and ornamental; some were dipped, others polished, curved; others straight; the castings of both common and best work being good, as also the finishing.

The door handles were the long plate kind with cranked arms, both plain and polished; substantial if not artistic work.

The hinges were of the plain kind, and of iron with the brass cover, also all brass hollow joints with plates covering the screw-holes, others without the plates. The "skew" or "rising" butt hinges were the only specimens of this kind of hinge shown, these not good; the steel joints have no height in the rise, nor are they well fitted in other respects. The finish, though not of first-class style, was very creditable; but the polishing and squaring of them might be improved.

The most prominent and meritorious piece of work exhibited by Russia is a pair of ornamental gates in brass, 14 ft. high, 10 ft. wide, and 1 in. thick, flat surface, sanded finish, of geometric design of rather indifferent quality, the chief line not having a graceful easy flow, rendering it unpleasant in tracing the lines in their course, although the system of repeats is adopted. The gates were cast in parts, the centre in one piece, the sides in another; the whole has a strong, bold, and durable look, by no means discreditable. Russia, in these gates, shows an example of enterprise which English manufacturers would do well to imitate.

CONCLUSION.

As regards the more elaborate examples of high-art workmanship from France and Austria, reported on, I am not aware of any English manufacturer who produces such excellent examples of workmanship in brass as they exhibit; yet I cannot but think it is not our inability to produce them so much as it is whether it will pay, this being the test to which all enterprise has to stand in cabinet and general brass foundery.

In my judgment we are excelled in artistic ability in the last-named works of high art, as the gates, in espagnolette fasteners, ornamental hinges, and in the colours of the bronzes.

The articles in which we are equal to them are plain or ornamental centre knobs, bell pulls and levers (of which I saw no examples in the Austrian or French Courts), letter plates, and door handles; those we excel in being hinges, plain polished rising skews, and other butt hinges, of which we have a great variety. In cabinet brass foundery generally I think the work produced in our best houses is of more excellent workmanship. The brass foundery of Birmingham has improved of late years, and doubtless will more so. A more practical turn is given to scientific and art instruction, by lending to schools of science and art some of the best examples of ornamental work, as examples for the students to copy or model from, whose studies should be guided by masters having a much more practical acquaintance with the principal trades of the town; these schools will then be in a position to turn out a class of students having a much greater amount of useful information on the theory and practice of design and ornamental art, as applied to manufacture, than they have done. Better means should be provided for imparting to the workman a thorough knowledge of his trade; and thus we shall be placed in a position we want to be in, so that, when other nations are putting forth all their strength, to measure theirs with ours, we may attempt something much more worthy of Birmingham than we do on the present occasion, although we do not exhibit very much. Doubtless manufacturers can give reasons for not having done so; still the fact remains. The best houses in other trades find it worth their while to exhibit, and they have gained and sustained the reputation which they so well deserve. If the best houses in brass foundery had been as well represented as other trades, we should have cut a much better figure than we do; and I do not hesitate to say we could have surpassed them in good plain square work and equalled them in some of their ornamental. We may congratulate ourselves, but we must look to our laurels to maintain and improve our position.

It is a matter of great regret that opportunities could not be gained to visit the manufactories during the time at our disposal; many useful hints are gained by this means which cannot be by any other; but so much time being necessarily taken to view the vast amount of work in the Exhibition, we were unable to do so.

Chandeliers and Gas Fittings.

By EDWIN PARKER,

Practical Superintendent of Manufacture of Gas Fittings, Birmingham.

IN visiting an Exhibition in a foreign country, much of its usefulness is lost for want of a knowledge of the language spoken in that country. Even with the aid of an interpreter you don't get the exact information you seek; either because the interpreter does not understand the subject you wish to ask about, or he puts it in such a way your meaning is not properly conveyed; whichever way it is, you frequently fail to get the information you require. With that difficulty to contend with, and not having the aid of an official catalogue, the greater part of my Report will be the result of observation in going through the various courts.

Chandeliers and other appliances used for lighting purposes occupy a conspicuous place in this great show of international industry; their size and usually attractive colours, in some measure, force attention even from those not particularly interested; to those who are interested, especially in my own case, the examination is, to a certain extent, only a partial one. To examine them properly, you want a glimpse of the internal work, to see if there is any economy of metal, better methods of casting or of construction; as that is impossible in an Exhibition, an outward examination must suffice.

The countries standing foremost in this section are Austria, Germany, France, and Great Britain. There are other countries who make a slight show, which I shall notice in due course.

AUSTRIA,

As might be expected, figures principally in glass chandeliers, of which there is a very attractive show. In all glass chandeliers I purpose noting the general appearance and method of construction only, the quality of metal (i.e. glass), &c., belong to the Reporter on Glass. (See Report of T. C. Barnes). Of metal chandeliers there is a limited number. If I am correctly informed, there are very few brass chandeliers made in Austria; what they do make are chiefly in zinc or iron, which is rather surprising, seeing that Vienna is one of the most brilliantly lighted cities in Europe; and as far as I could see, most of the magnificent hotels and restaurants were lighted with bright metal chandeliers. Hollenbach, of Vienna, exhibits a great variety of work, large and small, for candle and gas; the number of lights varying from 5-light gas to 120-light candle. Most of the larger chandeliers are richly gilt, clearly burnished, and of excellent design; reeded tube is used in some of the gas work; others are quite plain lacquered; the colour is good, and all well finished throughout.

Ditmer's (of Vienna) show consists chiefly of candle and oil lamps; many of them are made with a centre light with a large opal reflector, so much in use on the Continent. The bronzed articles are relieved with taste; the finish is generally good.

Ritter and Hauser (Vienna) exhibit chandeliers for gas, attractive to look at, but they will not stand too close an inspection. Where tube is used in the arms, the outlines are not good; the casting and dressing very indifferent; bronzing fair.

Grullemeyer (Vienna) has some compact gasaliers, hall lamps, and brackets, chaste in design; some of them cast, others made up with tube; the casting and making up good; the lacquering rather pale.

Wagner (Vienna) shows some pillar lamps and pedestals in iron, excellent in design and casting, the bronzing of a superior order.

Linsledt (Vienna) has some iron brackets for gas, very good in design, the casting equal to that of Berlin.

Hoemer and Dantine (Vienna) exhibit apparently the work of various makers. Where tube arms are used, they are generally of indifferent form. The vestibule lights, by Valentine Teirich, are an exception; they are free in design; the ornamentation is in excess to what we generally use in similar lamps; the bronzing is nicely done. Some pedestals for lamps are also shown by them, which are very creditable.

Messrs. Lobmeyer (Vienna) have a large collection of glass chandeliers, principally candle; a goodly number are mixed metal and glass. The metal parts are mostly gilt, others are steel bronzed. The smaller lamps are very artistically made up, chaste in design, and of delicate forms, varied by dish lights with enamelled rings, which have a beautiful appearance. The larger chandeliers are not so effective; they are distinct from the mixed metal and glass, inasmuch as they are all glass, but are so constructed as to require metal supports for the arms, the said metal being visible through the glass. As some of the outlines are of doubtful form, they have anything but the appearance of crystal chandeliers, as they are sometimes called in this country. This is particularly the case in the 66, 120, and 175-lights. The ornaments suspended by chain festoons are very primitive in form.

Zhan, of Vienna, shows some large chandeliers, similar in construction to Messrs. Lobmeyer.

Elias Palme, of Steinschonau, Bohemia, shows a number of mixed glass and brass, for gas and candle, which are creditable, also glass which are of a different type to the Vienna make of lamps. The metal connections are kept out of view as much as possible. Where a number of lights are required, they are made up in clusters, as shown in a 48-light for gas. The pendent ornaments are better in form, as also are those in the display of Messrs. Frenzel and Walter, of the same place, who have a similar show. The making up is the same in principle. Some etched dishes and vases are introduced with good effect.

Klingmüller (Prague) exhibits general fittings for gas and water: main cocks, bracket backs, ball joints, pendent bodies, &c., and water taps on the Lambert principle, finished well, and smooth (of English shape).

The Model Gas Works (Vienna) show fittings. The patterns are wanting in proportion; the casting is likewise bad; the turning is fairly done. A pedestal for gas, 5-light, is also shown, of fair design, iron gilt, but very roughly cast.

GERMANY

Is represented chiefly from Berlin; there are only two exceptions (Iserlohn and Mayence). They are by far the greatest exhibitors in metal chandeliers, &c.—show more than any other country.

Schaeffer and Walcker (Berlin) exhibited largely in chandeliers made of brass and zinc, several with a number of lights. Prominent is a 48-light for gas, opal candles and globes gilt, with figures holding clusters of lights; the design is good, so is the finish. The smaller lamps are also creditable in design: in some of them ornamental tubes are used; if the tubes are not of English pattern it is a very close imitation; in some other firms, where tube is used for branches, their shapes are indifferent. In the steel and other stain bronzes they are invariably burnished before bronzing; as they are "rivelled" badly the effect is not so good as the English bronzes of similar colour. The scroll work is exceedingly light; the work is cast and finished fairly. In another part of the Exhibition they also show general fittings—

mains, pendant bodies, &c.—all of them of English models, the larger work machine-filed outwardly; they were nicely finished. As they were nailed down, further examination was impossible.

Messrs. Spina and Son (Berlin) make a very imposing show of all descriptions of gas work in brass and zinc, or iron, bronzed, lacquered, and gilt. A 96-light with opal candles is a good example of a chandelier with a number of lights, well arranged and excellent in design. If I mistake not, a flat tube about 1 in. by $\frac{3}{8}$ in. ornamented on the thinner edge, is used in this chandelier, which would greatly economise the metal, and at same time have the same effect as a cast piece. A free use of figures is made in many of their lamps, treated conventionally; these are placed at the ends of arms holding lights. A flat reeded tube in a 6-light looks exceedingly well. All the work of this firm is creditably finished.

Kramne, of Berlin, like the other makers of the same place, cast their scroll work very light (the other parts may also be light; of course I can only speak of the parts visible); at the same time, by judicious arrangement, they have not a flimsy appearance. The colour is very fair, the turned work and filing rather roughly done.

Schaeffer and Hauschner (Berlin) occupy a considerable space with a varied assortment of zinc or iron and brass chandeliers, brackets, and pedestals. Two bracket chandeliers, 3 and 5-lights, deserve a word of commendation—free in design, and neatly finished (they have the appearance of iron). A large dish-shaped chandelier, five or six feet in diameter, with brilliants to fill up panels of the body, has graceful figures in the centre, either zinc or iron gilt. A large iron bracket with a figure holding a cluster of 9-lights; also a pedestal of iron for 12-lights, with griffins between each pair of arms, all famous for design, and cast well. In a 6-light the designer has been very daring: he has placed Mephistopheles at the end of an arm to hold the light. In brass they are not quite so successful as in iron; the bright lamps are not a very good colour, and in some cases the cocks are not at right angles with the glass holder, which spoils what otherwise would be a fair design. A lantern, silver bronzed and relieved with green, has a nice effect.

Elster (Berlin) shows a large bronzed chandelier with large griffins; also fittings rather lightly made.

Fischer (Berlin) exhibits fittings prominently; and large main cocks on the Lambert principle.

The Neptune Works show fittings strong and well made; some of the main cocks on the Lambert principle are as large as 2 in.

From Mayence (name of firm not given). The production of this firm will bear comparison with the articles sent from other parts of Germany. A 40-light zinc gilt chandelier is very massive. In a 15 and 18-light the flat tube is made good use of. In the same lamps there is a neat arrangement for increased number of lights without using the ordinary cluster. The same idea is worked out in several others. The bronzing in some of the zinc lamps is dull and heavy. There are some water-slide chandeliers, which is a rarity among foreign exhibits except where the centre light is used. Hall lamps neatly made are shown; no new feature is introduced. The whole of the work by this firm is fairly made. The designs are commendable.

Schmidt (Iserlohn) sends some massive brackets for candles.

Weyde, Ramp, Kettling and Co. (Iserlohn) have several chandeliers, lightly made, with ornamental tube arms.

FRANCE.

On entering the French Section, I was very much struck to see so many candle chandeliers (a trade which is nearly extinct with us in England, since gas has been so much in use). It may be that the French monopolise what there is done in that way from their superior designs, some of which are undoubtedly works of art.

Barbedienne (Paris) displays a compact selection of chandeliers, candelabra, and other forms of lighting apparatus, mainly for candle and oil. The chandeliers are massive, rich in ornament and in colour; I think they must be gilt. Many of their articles are steel bronzed. A pair of chaste candelabra of that colour, with bright parts in relief, have a very good effect (not with ornaments which can be detached, they are fixed wrought parts of the articles). All the exhibits of this house are highly finished; a great deal of false cored work is used, and, judging from appearance, they must be very heavy in metal.

Lemaire (Paris) shows a number of mixed glass and brass chandeliers, very showy, and of good colour.

Chabric and Jean (Paris), although not a large collection, have some articles worthy of note. A 2-light pendant, which may be intended for a billiard-room, from the wide spread of its arms, is a good specimen of finished work, not overdone with ornament, and yet sufficient to give the necessary strength; it is steel bronzed, burnished and relieved with bright ornaments. A bracket similarly treated looks exceedingly well. A circular lantern, about 18 in. in diameter, is also well made.

Ernest Royer, Jules Graux, Buffet and Co., all of Paris, exhibit chiefly ornamental candelabra, &c., for candles and oil, in which the care and the skill which distinguishes French work is observable.

ITALY.

Salviati and Co., Venice, exhibit famous coloured and flint glass in a 200-light chandelier, and in other examples less in size. The brass connections are kept almost entirely out of sight; some of the shapes of the arms are very elaborate, and such as I have never seen used for glass work before.

Bassano, of Venice, has a similar collection, including a 50-light glass chandelier.

RUSSIA

Is represented by one firm from St. Petersburg, who show a 60-light chandelier for candles, made with twisted tube arms. The wrought work we usually chase is left plain. In another 24-light chandelier, vine pattern, the grapes are of coloured glass. Both of these chandeliers are gilt. There are also two church chandeliers, saw-pierced, lamp in the centre, plated. There is nothing to call for special remark in these chandeliers; they show that Russia is not entirely dead in work of this kind.

GREAT BRITAIN,

It might almost be said, is represented by Birmingham. Out of eight firms exhibiting, seven are from Birmingham; the one exception is Messrs. Green, of London, who send glass chandeliers, one of considerable size, about 60 lights.

Messrs. Winfield and Co. have the most numerous and most complete display of any firm from England, showing chandeliers from 3 to 8 lights, an elaborate altar light, brackets, hall lamps, star lights, gas stands, &c. The reputation they have so long enjoyed for excellence of work is well maintained in the present Exhibition. In looking round, it will be seen that other firms have made great progress in producing good work, and are running the race of competition in pretty close quarters with Messrs. Winfield and Co.

Best and Lloyd send chandeliers, brackets, hall lamps, gas stands, and lantern. Their display is not a large one, but for colour, and neatness of finish, would be a credit to any firm. In a pair of gas stands, some enamel is introduced with good effect; it might have been extended to some larger articles with advantage. There is very little enamel shown in this Exhibition applied to chandelier work.

C. J. Phillp and Son do not appear to have made any special effort to produce anything new, the chandeliers they show being the same as exhibited in Paris, 1867.

Messrs. Blews and Son exhibit chandeliers only, chiefly 5-lights, of various colours, some of considerable merit, and generally a very decided improvement on their former effort in 1867 at Paris.

Ratcliff and Tyler have a style peculiarly their own, as is shown in their 3 and 5 light chandeliers. They are all steel bronzed, and relieved; some are of a very novel form. Two mediæval corona, each of 8 and 10 lights, are also shown, picked out in various colours.

Messrs. Partridge and Co. exhibit 3 and 5-light chandeliers, and brackets. Some of them are of fair design, but generally wanting in colour and finish.

Schletter and Co. (not manufacturers) exhibit a massive 5-light chandelier, brackets, and hall lamps, rich in colour and highly finished.

In taking a general review of the whole of the chandeliers and gas fittings exhibited, those shown by each nation has some quality in which they excel. It is said that one of the uses there is in holding International Exhibitions is to bring about a sort of blending of these various qualities, and so produce a perfect article; that, to some extent, is no doubt true, but not altogether so. As the modes of living, habits, taste differ, so the articles they use differ to suit those tastes. In chandeliers the prevailing rule is to make them "stiff" (that is not to pull down). In the German and French chandeliers, where a slide is required, the centre light is used, be it for gas or oil. The consequence is the French and German chandeliers are better filled up in the shaft or centre. There is more scope for the designer. In many of the chandeliers the arms are started higher up than with us, enabling them to get some very graceful outlines, which in sliding lamps would be impossible. Even if the balance weights are of good design, still there is a monotonous appearance in a cluster of weights hanging in the centre of a chandelier; most of our chandeliers have to do the double duty of slide and stiff; they are generally arranged to suit the former. In large chandeliers no comparison can be drawn; in brass chandeliers by English makers the largest shown are only for six, seven, or eight lights. In colour, where the work is bright and dependent on the quality of the metal used for that colour, English articles stand first; there is, evidently, much more copper used in the composition of the brass than in foreign work.

In bronzes the steel bronze of various shades are universally used. English goods in that colour bronze will stand the test of comparison with either French or German. Of other bronzes not much is attempted by English makers. In the red bronzes there scarcely seems light and shade sufficient to get a relief; some excellent examples are shown by Messrs. Blot and Drouard, of Paris, in that colour. Messrs. Winfield show some figures in this bronze, very creditably done; and Messrs. Blews have a 5-light chandelier relieved with green, which, if not up to the French model, is an attempt to get out of the beaten path; the same firm have also some figures bronzed, which are fairly done. I am informed that paper gilt is much in use in Germany in the decoration (instead of burnishing the tube parts of chandeliers), which, of course, would be cheap. If it is used in goods in the Exhibition, it is very neatly put on: from the height at which the chandeliers were hung, I was not able to detect it.

In general finish the English chandeliers and gas fittings hold their own. In many instances, particularly among German goods, where the form of arms, &c., depend upon the workman, as where tube is used for arms or other purposes, the shape has been and is anything but good; of course, in cast arms the modeller or pattern maker settles the outline. Another notable feature in foreign goods is the absence of the principle so often enforced by our teachers in art, that, where any part of an article is indispensable, as in a tap for gas fittings, it is better to make it form a part of the design than to put it in an inconvenient place, or place it in some position where it has no connection with the design.

The general condition of the workpeople belongs, I understand, to another Report. In the metal trades, in Vienna, wages average 30s. per week; hours of work from 8 a.m. to 6 p.m.; an hour for dinner out of that.*

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* In Vienna there are 900 workers in bronze (involving equal skill, if not more, than in the manufacture of gas fittings); of these, 200 earn per week from 12s. to 14s.; 500, 14s. to 18s.; 100, only 18s. to 22s.; and 100 at piecework, from 14s. to 20s. The hours worked are from 6 a.m. to 6 p.m., one hour for dinner. Lampmakers and plumbers get 10s. per week. Smiths and ironworkers, simply because the supply is *below* the demand, are the best paid workmen in Vienna (in the metal trade); good men get 24s., *best* 36s. per week. Of German silversmiths there are 300; 200 get 12s. to 14s., and 100, 14s. to 20s. per week; hours worked 12, 1 hour for dinner; extra work is paid for at 3d. to 5d. per hour. Saw grinders (a riskish and dirty trade) get from 14s. to 16s. per week. As a rule, the hours worked are *longer*, the wages *lower*, than in England.—Ed. *A. R.*

Tin and Japanned Goods.

By HENRY BISHOP, *Practical Foreman, Messrs. Griffiths and Bravitt, Birmingham.*

IN submitting this Report of my visit to the Industrial Exhibition at Vienna, it is not necessary to dwell upon the inconveniences incidental to so long a journey; suffice it to say we arrived there on the fifth day after leaving Birmingham, and about two hours later found ourselves at the Exhibition. We were there introduced to Philip Cunliffe Owen, Esq., the British Commissioner, and by that gentleman to His Excellency Baron Schwarz Senborn, who gave us a very cordial and hearty welcome to the Austrian capital.

Before proceeding further, I wish to mention that it is possible there may be exhibitors of whom no mention will be made in this Report, and whose contributions I failed to discover. The enormous size of the building, and the non-classification of articles, rendered it a very tedious and difficult task to find them out.

In the British Section there was not so much trouble, as each of your reporters were furnished with an official catalogue containing all the information necessary. Not so, however, with the other sections: no such catalogue could be obtained, and at every fresh visit to the building we were obliged to commence a fresh voyage of discovery.

However, the result of nine hours per day, which I spent in the Exhibition during the time I was at Vienna, I shall give in as brief and concise a form as I trust will do justice to the mission on which it was your pleasure to send me.

The great progress which English manufacturers have made during the last few years, and the development of new ideas which have been brought to bear in the production of superior articles, led me to expect that the manufacturers of other countries were progressing in the same ratio. It was, therefore, with no preconceived notion of our own superiority that I visited this Exhibition, but with a determination to carefully examine, give credit to whom it was due, and report impartially between all parties concerned. This being an Austrian Exhibition, courtesy demands that I should assign to that country the first place in this Report. I, therefore, commence with Vienna.

AUSTRIA.

Messrs. Hardt and Co. exhibit an excellent assortment of stamped hollow ware, consisting of saucepans, stew-pans, &c., the whole well tinned and finished.

Puntchent.—A collection of straight-sided coffee filterers, the whole of unplanished tin, but neatly made. A small zinc hip bath, of new and pretty design, made up bright, the arm, rests, and moulding nicely burnished.

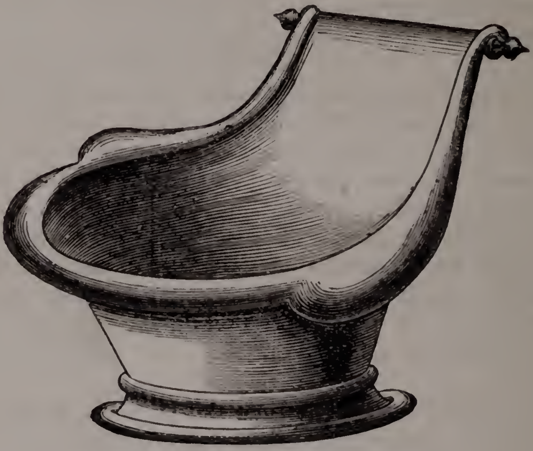

Fig. 43.—Zinc Hip Bath, by Puntchent.

J. Schier.—A large case, filled entirely with jelly and other moulds. A very extensive and good assortment, many of them being quite new in design, representing several kinds of fish, &c.

— *Weichman.*—Here was an excellent and varied assortment of ship and railway signalling lamps. The workmanship and finish being of a very superior class.

J. Kiliner, Lamp and Lantern Manufacturer.—A large display of signalling and other lamps; the whole were made and equal in every respect to those shown by Weichman.

FRANCE.

Gay, Paris.—This was an exhibit exclusively of jelly and other moulds, mostly stamped; the patterns good, and many new designs; one large one, the model of a castle, was peculiarly attractive and beautifully made; a very expensive article.

Letang.—Some very good jelly and pudding moulds, both stamped and hand-made; also some paste cutters of novel design, one representing a cavalry officer in full length, with epaulets on the shoulders and braiding of the jacket; an infantry officer, in full dress, with sword, &c.; a bicycle, with its rider, the wheels and other parts well delineated. Here was also a very large vase, the parts stamped and put together by hand; an excellent piece of workmanship, but not an article of general utility.

Letang, Foublantier, showed among other articles a quantity of moulds, the whole very common, and in no respect to be compared with those previously described.

HOLLAND.

J. G. Stelling, Amsterdam.—Copper ship lamps of the ordinary kind—workmanship and finish not equal to English manufacture; cash-boxes, dressing-cases, knife-trays, letter-racks, and other articles made exclusively of the patent printed tinplates. These I consider to be a Cheap-John class of goods, and could only have been sent to this Exhibition to show the purposes to which the material could be applied. A redeeming feature in this department was some wrought copper goods, which were fine specimens of raising by hand, and reflected great credit upon the workman.

E. Cohen, Berlin.—Oblong, oval, and Gothic trays. These were well planished, neatly wired and finished. A small assortment of other goods of a very common description, comprising dust-pans, sugar-boxes, funnels, and measures, all in plain tin.

A. Frank, Munich.—Foot-pans, toilet-jugs, and pails, grained oak with black hoops, cheap and very common in make. A quantity of culinary utensils made in sheet iron, and tinned thereafter; also a few articles of stamped hollow ware. These were very good, and the whole well tinned and finished. Some coffee filterers, common tin, but neatly made.

J. Weinhardt, Munich.—Among a variety of other articles was one good toilet set, chaste in design, and japanned in a very elaborate style; a very expensive set.

Carl and Co., Lubeck.—Some stamped saucepans, stew-pans, ladles, &c.; also an assortment of hand-made bellied pots, the sides riveted, and seam round the centre of body; bad imitations of the stamped articles, very much broken in wireing, and such as in England would be considered and sold as imperfect articles.

B. G. Weismüller and Co., Dusseldorf.—A general and good assortment of hand-made hollow ware; also some good stamped articles; the whole well-tinned and finished.

C. A. Schwotzer, Zwoenitz.—A very small display of piece-made tin goods of ordinary description; common, but very neatly made.

Philippi and Ceto, Stromburg.—The articles shown by this firm, though not numerous, are deserving notice; more particularly a set of pudding moulds, varying from 8 in. to 13 in. in diameter, each of them stamped from a flat disc of iron finished off by hand, and afterwards tinned, the only seam in them being that of the pipes, which were brazed in at the tops. I was much struck with this lot of moulds, which, for workmanship and finish, were equal in every respect to similar articles made in sheet copper. Beside these there was a good "nest" of stamped saucepans from 5 in. to 13 in. in diameter, the largest being 6¾ in. deep. They were well stamped, and the tinning of all their articles was exceedingly good.

BELGIUM.

Tremouroux Brothers, Brussels, have a general assortment of stamped work, which is very good, both in regard to the stamping and tinning; also some enamelled cast-iron hollow ware, which is very good. Some coffee-pots and filterers shown by them are very common.

Deloye, Masson, and Co., Belgium.—An excellent lot of stamped work, tea-kettles, saucepans, bellied pots, jugs, &c., are well got up and tinned. They have also some stamped iron soup tureens, richly enamelled in white, green, and gold, elegant in design and execution, and reflecting great credit upon their establishment.

ENGLAND.

Having gone through my list of foreign exhibitors, I have now to deal with those from England.

Messrs. Perkins and Son, London, exhibit a small but good selection of shower, slipper, hip, and travelling baths, toilet sets, coal vases, cash-boxes, sets of tea-trays, &c. One round waiter, about 48 in. in diameter, which had evidently been got up for this Exhibition, was beautifully inlaid with pearl, and further ornamented with a good flower centre; a set of raised dish covers, and other tin goods of the ordinary description, the whole of excellent quality and workmanship. This firm also showed some stamped ware, the largest being a basin 24 in. in diameter. These articles were certainly inferior in regard to finish to many of those of the same description exhibited by Continental manufacturers.

Messrs. Collings and Wallis, Merchants and Factors, Birmingham (manufacturers' names not given).—In their department was an excellent assortment of tin goods, and in my opinion the best in the Exhibition. The japanned ware, which comprised toilet sets, coal vases, tea-trays, waiters, &c., were all well executed. The waiters particularly were elaborately but consistently ornamented with gold and pearl, the style and decoration altogether being chaste and elegant. This firm had also a great variety of general and furnishing ironmongery goods, which deserve, and, I have no doubt, will be dealt with by the reporter for that speciality.

Messrs. Schletter and Co., Merchants, Birmingham (manufacturers' names not given), in addition to a great variety of other articles, had a good assortment of tin and japanned goods, similar to those shown by other English firms, the whole exceedingly well got up, and the japanned work richly ornamented.

Conclusion.

I have now, so far as I know, gone through the list of exhibitors of tin and japanned goods, and, in addition to the articles already described, the copper works shown by several foreign manufacturers deserve special notice. Besides those intended for domestic purposes, I observe some wrought domes about 6 ft. in diameter and $\frac{1}{4}$ in. thick. I consider them extraordinary specimens of copper raising, and it appears to me that greater progress has been made in this than any other of the branches on which I have reported.

Before closing the descriptive part of my Report, I may mention that for what purpose some of the articles were sent to this Exhibition I am at a loss to imagine. They appear to be a miscellaneous lot, taken indiscriminately from ironmongers' or manufacturers' stocks, simply for the purpose of advertising or giving publicity to the various articles of their trade. For instance, among other things, was a small glass lantern, which had evidently been made a considerable time. The painting, originally very gaudy, had become faded, and the article itself was in a dilapidated condition; perhaps the reason of its being exhibited was to show the contrast between it and awe ll-made article.

From the description I have given of the articles enumerated in this Report, it will be seen that our Continental competitors confine themselves, in a great measure, to the manufacture of the same class of goods, viz., stamped hollow ware, jelly and pudding moulds, common tin and cheap japanned ware, and that they make no pretensions whatever to the production of articles of a superior sort. It is, perhaps, unnecessary to state, that originally all articles of tin plate were made up of pieces soldered or seamed together: those unsightly seams were a great disfigurement to a good or expensive article.

Mr. Thomas Foxall Griffiths, late senior partner in the firm of Griffiths and Browett, by means of stamping and burnishing, was enabled to produce articles which are far better and more durable than was possible under the old system. By the "Griffiths" process, beauty of line and surface are secured, and such articles as hot water, meat, salmon, and vegetable dishes, soup, and sauce tureens, &c., are made quite as elegant in design, as the most costly of a similar description made in silver or electro-plate; but such as these, foreign manufacturers of tin wares do not attempt to make. In fact, their object appears to be to make for the million, and only such things as are in every day-demand. In the show rooms of a Birmingham manufacturer may be seen at a glance a far better, more extensive, and varied display of really good tin and japanned ware, than could be found in the whole of this Exhibition, and I am thoroughly convinced the English have nothing whatever to fear from foreign competitors, in regard to those articles for which Birmingham and the district stand pre-eminent.

But in justice to those who made even the commonest thing of which I have spoken, I must admit that they are all characterised by that degree of neatness which may be imitated with advantage by many an English workman. The ship and railway signalling lamps, to which I have referred, demonstrate the fact, that both the Austrian and German makers are able and do turn out such an article as cannot be surpassed by any English manufacturer. Of any peculiar method they may have in the production of their work, I am unable to speak, as, even if there had been time, no facilities were afforded for visiting any of the workshops or manufactories. On the question of wages I am not able to say much. I find a custom prevails in Austria to a great extent for the journeyman, if single, to live and board with his employer. But the wages paid to those who live out, and board themselves, are lower than what is paid in England, which is counter-balanced by the very moderate sum charged for their maintenance.

Table and Ornamental Glass.

By THOMAS C. BARNES, *Glass Worker and Artist, Birmingham.*

IN presenting my Report on the glass trade, as illustrated in the Exhibition at Vienna, I will address myself first to the glass to be found in the

ITALIAN DEPARTMENT.

One of the most striking and wonderful parts of the Exhibition is that of the revival of the ancient art of glass-making by Dr. Salviati and Co., of Venice. The beauty of their colours, and lightness of their "metals," is peculiarly worthy of great praise. We take, for example, one of their wine glasses. The bowl is supported by a group of the most beautiful flowers and leaves it is possible to conceive. The design is founded upon the form of the delicate snowdrop; the weight of the glass is not more than an ounce and a half. A goblet with flat twisted stem, like a corkscrew, the edge of the twisted ribbon of glass adorned with the most delicate "pincing"* it is possible to "run;" the stem is attached to a ribbed knob, placed on the back of a beautiful white swan, the grace of the bend of the neck of which was one of the most artistic features; the foot of the goblet was threaded with aventurine, and the top of the bowl also, and yet the goblet only weighed 3½ oz.; the body of the swan was blown in the ordinary way, a piece of metal then "gathered" and sunk in the body, which was pulled up, curved, and shaped to form the neck. A small flower vase, light blue, and ribbed in a mould threaded at the top and bottom with "aventurine," † with four small knobs in the neck, and globe body with light foot; on each side were attached four small handles to each knob; there are also small "pincings" running down the four handles. It is one of the most beautiful pieces of glass work I ever saw, so neatly, skilfully, and beautifully blown; not only is the blowing exquisite, but its artistic merit is in harmony. The handles are of flint glass, also pinced. The conception of this vase is masterly and artistic, a great credit to the workman for the ingenuity displayed. So delicate are the small parts, that many workmen in the trade would think that they were not, or would have been produced in the glass-house. There is a large flower basket made of glass, about 14 inches in diameter, filled with a beautiful assortment of flowers and grass, all made in glass, placed in the basket just as if they were fresh gathered. There are flowers of every kind, with different colours and shades, of colours so beautifully put together, that my fellow workmen would think it impossible that they were artificially made. There is also a flower vase stand composed of three different receptacles to hold the flowers: one of the latter is delicate opal, the other ruby, and another light blue, threaded with "aventurine" on the lips;

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* "Pincing" is produced with a pair of plier-like tools, the cheeks of which have cut in them the device required. The heated glass is subjected to their pressure; the result is a reproduction of the ornament design sunk in grip or mouth of the pliers.

† Aventurine, or "aventurino," as it is sometimes called, is a variety of glass made only in Venice; it is in colour that of a rich amber; in it are suspended particles of apparently gold, (familiar illustration) a glass of good sherry, with particles of leaf gold floating in it.—ED. *B.A.R.*

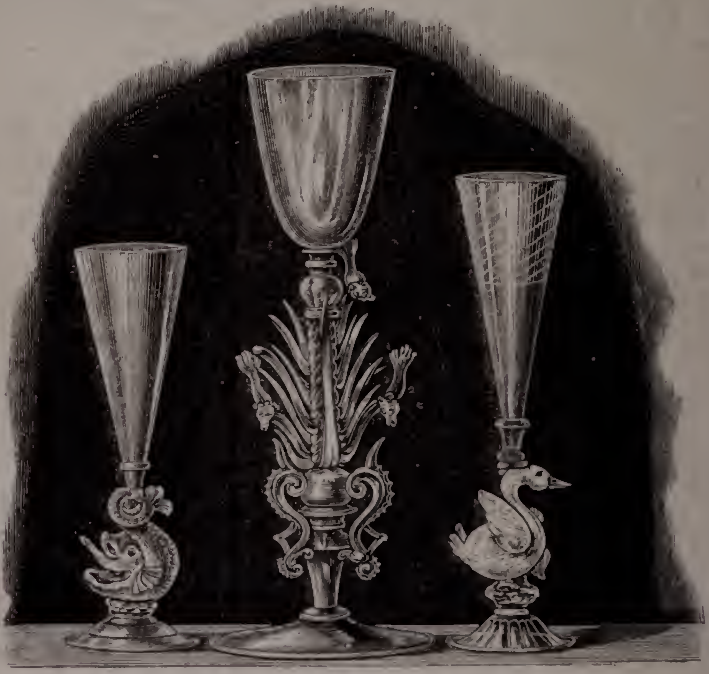

Fig. 44.—Group of Glass by Dr. Salviati and Co., of Venice.

the three flower holders are attached together as a trefoil by means of small pieces of flint glass. To cover the connection of the flower holders to the stalk, there are beautiful butterflies, with their wings stretched out, apparently holding the three flower holders. So artistically are the wings made to touch the vase, the body of each butterfly so curved to give life and force, they seem as if they were going to fly away from the place they rested on. The wings of the butterflies are variegated with the most beautiful colours it is possible for even nature to give. This stand is placed in a dish of light-coloured glass. This is only one of the many great conceptions which prove the ability of Salviati and Co. to produce the most perfect specimens of the glassmaker's art. There is scarcely anything in nature but what they can produce, as flowers, flies, ducks, dolphins, snakes, and other animals, too numerous to mention, created and introduced on the works made by these celebrated Venetian glass-makers.

There is also another of the most wonderful triumphs of art in glass-blowing that man can conceive (a tazza), which I wish to describe. The bowl of it is composed of the beautiful gold-coloured glass, called aventurine, and of threads of white and light-blue glass, plaited together as truly as if they were woven. The bowl rests on three scrolls made in flint glass, the edges threaded with ruby. Resting on these scrolls are dolphins, with the tail of each supporting the bowl. The dolphins are not "moulded," as we should make them in this country; they are blown by the glass-maker, the fins and the eyes put on while in the course of making; they are beautiful and light, and their colour delightful. There is not a gem got from the bowels of the earth, but what the Venetians have copied the exact colour. There are colours produced in Venice we, in England, have never seen in glass.

The jugs of Salviati and Co. are very beautiful in shape, some of them most difficult to make. The handles of these are made before the body; they are made like a scroll, and then attached by two small pieces of flint glass while the body of the jug is being made. The Venetians were the first to introduce the star-sectioned form of handle into Europe. There was a jug 12 inches in height; its body was made and moulded in an 18-in. ribbed mould, and thereafter ornamented with leaves, flowers, and fruit. The flowers and leaves are attached by means of small pieces of flint glass. These flowers, &c., are artistically arranged round the body; and are tipt with the beautiful colours and tints only seen in Venetian glass. The colour and twistings of the leaves are grand masterpieces of skill and ingenuity.

There is a great error entertained in this country by glass-blowers, viz., that the Venetians make a great deal by means of the "lamp." It is not so. The attachment of the several pieces which make up Venetian work is all done in the glass-house. They have pincers to "pince" the most delicate flowers and leaves, and as they are continually in the practice of "pincing," their tools are made more carefully and smaller than ours; they also use them more freely and skilfully, and accomplish thereby works which excite our wonder. I had the pleasure of being introduced to Dr. Salviati by Mr. Aitken and Professor Archer. He told me that two of the best workmen, and the families they were descended from, had been connected with the glass trade of Venice for more than 300 years.

At Murano there is a special museum for glass, which contains examples of Venetian make, some of which are very old. If a workman has any difficulty, he at once goes to the museum; so they have all in their favour.*

I now come to the chandeliers of Salviati and Co. They are somewhat remarkable, and at once attract the attention of the visitor. They are so graceful you can look at them a long time without the eye being disturbed by one feature which offends. They are made remarkably light, chiefly of flint glass tipped different colours. The shafts and arms of the chandeliers are twisted; to their bodies pinced leaves and flowers are attached of various colours.

To form the round or oval frames for the looking-glasses, for which Venice was celebrated, fern leaves and flowers, as decorations, are freely used. A remarkable feature in the production of Venetian glass was that it was ornamented with its own material, the glass-blowers doing all the work, the glass-cutter and the engraver being entirely left out. Before closing this notice of examples of the "revived" glass of Venice, I have to thank Dr. Salviati for his kindness in allowing me the privilege, not only of taking notes, but letting me handle everything I liked to examine, and trying the weight, which was necessary for its more complete inspection. For delicacy, grace, and refined beauty, the works of this house are worthy of Venice in its palmiest days.

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* The doing the "work for the work's sake" principle which animates the writer of this Report, shows he would take advantage of such a museum as that at Murano. It is much to be desired that artisans did visit museums more generally than they do (where such are founded for them). South Kensington Museum is an admirable example of what a museum to aid industry should be. Of it and its effects, and those of museums generally, see Report published by the Birmingham Chamber of Commerce.—Ed. *B.A.R.*

J. Bassano, Venice.—There are but few samples of blown work in this display; it is more remarkable for beads of the most splendid description, some of which are enriched with glass filigree of every pattern you can mention, incrusted in the middle of light green glass, &c., &c. A great many flowers in glass are put and worked on the outer surface, of different colours on black, and dark amber; also fine examples of imitation closely resembling real pearls: these are produced by being blown at the lamp singly, the scales of the roach or dace are ground up in varnish and injected into the inside of the beads, which produces the pearl-like appearance. The scales used must be stripped off the fish while living, or the glistening hue admired so much in the natural pearl cannot be secured.

The Glass of Roumania.

B. C. Poppovits.—The glass of Roumania is very quaint in shape and colour, but its clear or white glass is quite green. There are some examples worthy of notice, the handles especially. These are hollowed out so as to allow of a firm grasp, and are so strong in appearance as to impress the idea that they will support the weight of wine or water the vessel is required to contain. There is one thing against pouring the water or wine out of these vessels exhibited. In the claret jug shown, its lip is made flat at the top, which is greatly against pouring.

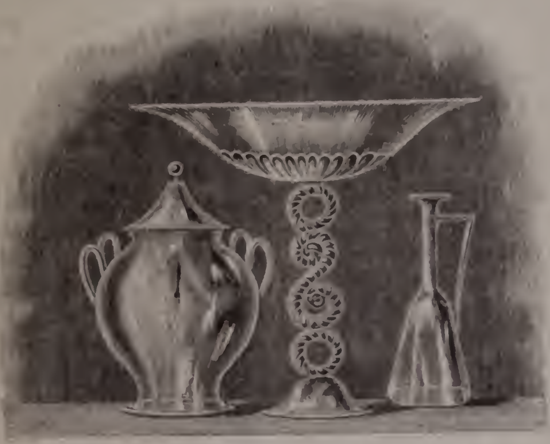

Fig. 45. Group of Roumanian Glass, by Poppovits.

One vase exhibited is a beautiful shape in the Roman style; the handles attached to it are different to any I have ever seen made, and are very unique; they are attached so as to form a double handle, that the fingers can be easily inserted. The decanters and tumblers shown are very ordinary, also the other examples of small glass work. There seems no evidence of a desire to finish the work off clean. Whether the geographical position of Roumania (as some think) has to do with it, I cannot say, but their work seems to indicate indolence; there seems to be no spirit to carry out their work, no evidence of aspiration; the finish is such, that no country but their own would buy their glass wares.

CHINESE DIVISION.

In it there was a very tasteful service of flint glass, blown, cut, and of a good colour. A glass tea-pot and sugar basin were also well blown; the cutting is not so sharp as it might have been, and of a different style of ornament to what we generally see. These examples were made with great skill; that they were appreciated is evident, as they were purchased by L. Lobmeyer, of Vienna, one of the largest manufacturers in Austria. There were boxes of ruby and flint, cut with expert skill into small diamonds and other geometrical forms of cutting; and scent bottles, variegated with many colours, blue, black, white, red, green, aventurine, and yellow, of the most beautiful opaque glass. Some large specimens of glass rings had the appearance of the material not having been properly fluxed. The use of these appeared to me to be as bell-pulls; they were threaded like Venetian work with various colours; although they appeared rough, they had certain charms of colour which strike the visitor. There is no doubt the Chinese workman, by whom these rings were made, had a knowledge of the Venetian work. They have an ingenious method of joining these rings so that you could scarcely detect where the joint was. The glass buttons exhibited are delightful; their different patterns and beautiful colours are deserving of great praise. There is nothing in the Exhibition, as regards glass buttons, so good in colour, or so beautifully made.

PORTUGAL.

It is surprising to see Portugal so backward in the glass trade, being so close to countries where so many glass manufactories exist; the lamp shades are its best work. Their decanters, jugs, clarets, wines, and tumblers, are inferior in colour and make; they are the worst patterns of handles I saw, so far as the examination of the glass ware in the Exhibition is concerned; the Portuguese articles put me in mind of work done in England 200 years ago, I do not think English work at the period named would even reach the low standard of the Portuguese examples. The progress Portugal has made has been greatest in lamp shades. Their table-glass is not so good as some of it examined by me in the Paris Exhibition; the designs of the "compotiers" were heavy; the metal has no lustre in it. Industrial enterprise does not appear to be very strong in Portugal.

Greece.

In this division the glass is very inferior; the wine-glasses, decanters, and other things are below the standard of those exhibited by any country in the Exhibition. It is a curious fact that the manufacture of glass was a few years since unknown in Greece. It is only a few years since a glass-house was established by a gentleman in order to revive the manufacture known to the ancient Greeks, and worked by them skilfully and successfully.

The colour of the flint glass shown is low, with no lustre in it; the ruby is too pale, and has no depth of colour. The material for the making of glass is scarce in Greece; there are disadvantages arising from want of capital, and an industrial population has yet to be created. The effort to revive an industry in a nation again attempting to elevate itself has induced me to examine and direct attention to the few examples exhibited.

Russia.

The improvement in the Russian Department is great since the Paris Exhibition of 1867. The advance made is deserving of great credit. There are good examples of light work well blown, the forms artistic, the glass clear and of good colour. A service of pale green, ornamented with fine gold work in the Russian style of ornament, has a beautiful effect (not overdone, like some of the German work), and is well made, considering the Russians are so young in the trade. The services of flint glass wine-glasses, decanters, jugs, clarets, tumblers, and custard-cups with handles, are very light and of good colour. The wines are not "sheared" by the workman, but cut off at the top, which takes away from the artistic skill of the maker. The Russians follow out the mode of work of the Germans, and blow their work in wooden moulds, a method which is calculated to destroy the art of "hand work." The best piece of blown work shown was a flower vase with two twisted handles and a twisted stem, which was well made: a large cut vase, three feet in height, on a pedestal, but blown in pieces, in wood moulds, and fitted together. This is the only piece of glass of any thickness that you could judge by. In Russian there is not the beautiful colour of English glass; the cutting is also inferior. Fruit dishes of dark green glass, and enamelled with a design in white and gold, were overcrowded with ornament. In many examples the overcrowded decoration is done to hide the bad making or the marks from the moulds used. Their fruit dishes are beautiful examples of colour. So far as I could learn, the specimens exhibited are made by the French and German workmen, who have migrated to Russia through being encouraged by the Emperor, to give his nation the advantages of the instruction to be derived from skilled workmen from other countries. The flint trade in table glass has not been known in Russia more than twenty or thirty years, and has been taken up by the present Emperor with great spirit. The external forms of Russian glass articles are generally good and worthy of commendation.

Austrian Department.

J. and L. Lobmeyer.—This is the most extensive display of glass in the Exhibition. They exhibit glass goods of every description. The most striking and peculiar are two large vases with handles on each side decorated with cutting; the body of the vase close to the shoulder is cut, and concaved, to admit the fixing of the handles quite close; the body of the vase is drilled for the reception of metal screws introduced to hold the handles on fast. The colour of the glass of these examples is not first-rate, but passable. A light service of blown glass, the wines of which are sheared and well made, is especially worthy of notice. The design of it is beautiful and well carried out, the engraving well adapted to the form; this is the finest service seen by me in the Austrian Department. The wines of Lobmeyer were well sheared (not like the majority of the German class), the stems of these well "forged," and the foot opened clear out. The jugs, decanters, and dessert dishes, many of them blown in wooden moulds, and with the fine engraving introduced on them, deserve commendation. Their jugs are well made and ornamented by engraving chiefly in the Greek style, figures being very frequently introduced. The same firm has a "service" blown in wooden moulds very light, mediæval in shape, and well decorated, remarkably clear, almost equal to blowing by hand workmanship. A beautiful dish, blown by hand and very light,

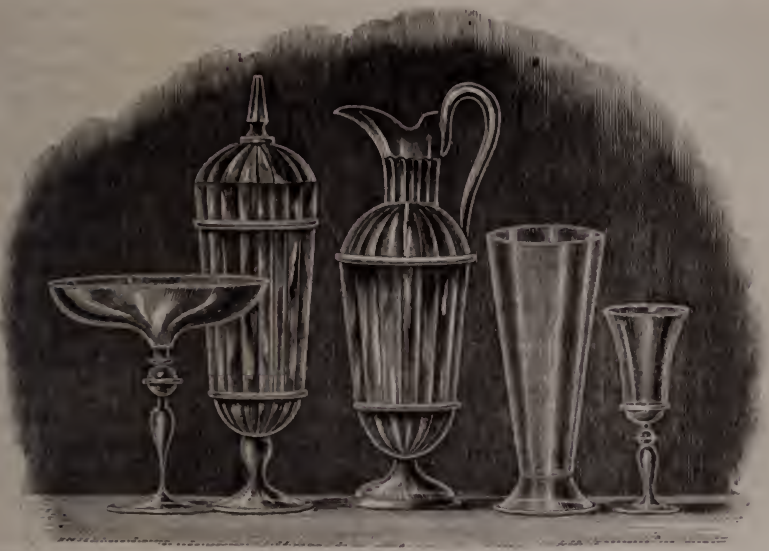

Fig. 46. Group of Glass by J. and L. Lobmeyer, Vienna.

14 in. in diameter, shows skill in making and engraving. Its decoration is a beautiful specimen of workmanship in the Renaissance style. It has been purchased for the Vienna Museum. In several large oval dishes the artist expressed his meaning by the most conventional treatment. A great many vases were exhibited by this firm, decorated with pastes or sham stones being attached to them by means of cement. The cased or coated glass in this department is worthy of comparison with any made in Europe ; the colours are excellent and equal all over, but they cover their work (in decorating) with too much gold, which is inconsistent with true art, suggests vulgarity, and destroys the effect of otherwise excellent work. The chandeliers exhibited by this Austrian firm are very extravagant; there is not much beauty shown in their construction ; some of the pieces connecting the chandeliers are made very inferior. The colour of their glass is not yet that of pure crystal, but a great improvement has been made by them in their "metal"* since the Paris Exhibition. They are approaching us very fast; there is no use attempting to deny the fact, as it stands there to speak for itself, and is visibly written on this splendid collection of glass produced by Messrs. Lobmeyer.

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* "Metal" is the term used for glass by artisans, manufacturers, and others in the glass trade.

Henry Illrich, Vienna, shows some good examples of dessert services, and a great quantity of coloured glass, green, enamelled, and gilt, the general surface being entirely covered with enamel colours. The vases are generally good, presenting much variety of form.

J. E. Schmid, Vienna, occupies a prominent position in the German Department, exhibiting a great quantity and variety of articles for every-day use. His flower vases of twisted flint glass are a great success, well designed, and coming close to our "flower" work. He has studied more closely the mode of English work than that of any other country ; his work has, therefore, a closer resemblance to that produced in our star moulds in England than that of any other manufacturer in Austria. An inkstand and flower vase united in one object, executed in pure flint glass : the ornamentation, in the twisted style, is as delicately worked, and the colour of the glass as beautiful, as any seen by me. The wines and water jugs of this exhibitor are well made, and of a good colour also.

Joseph Conrath and Co., Leipzig.—The examples on this stall are of the most beautiful colour, and well made. They are elegant in form and decoration. The light green service is not overcrowded with gold, like much of the glass work of Germany. Light wine-glasses, goblets, tumblers, jugs, and clarets, are blown clear and light ; but their wines are "cut off" at the top, not "sheared," which leaves them in an apparently unfinished state ; however well they may be cut off, they are unpleasant to drink from.

Mayer, Heitte, and Haida, Bohemia, exhibit a large table made in glass, about 24 inches in diameter, and about 4 feet high, standing on three legs, made in pieces ; the top is cut on the under surface so that the upper surface may be smooth. There is some good workmanship shown on it, but the colour of the flint metal, of which it is made, is low, with a tinge of green running through it.

Hofman, Prague, has examples of glass cutting and engraving which are splendid ; the cutting is admirable, as showing the prismatic colours ; there has been great attention paid to this essential part. The making of the cut articles is generally good ; the colour of the glass equal to any shown by any of the Austrian exhibitors.

E. Emanuel, Pelikan, Haidæ, Bohemia, furnishes for exhibition some beautiful examples of brilliant coloured glass with novelty in form and good ornamentation. The most remarkable features are seen in the production of their flower vases, which will bear comparison with many of our English. The different parts of the vases, when they are made separate, are neatly put together; the rings are well made, and attached securely to the body of the vase. The hanging baskets exhibited in this collection are delightful in shape; the designs are generally good.

J. Schneiber, Bohemia, has some good examples of flint, ruby, and blue large vases, and a good deal of useful general work; the colour of the flint is passable; the ruby is good; the coloured vases are well blown, but in moulds. This process of blowing glass in wood moulds has been tried in England, but, owing to the destruction of the moulds by the heat of the glass, they speedily become unserviceable, and the process has been abandoned. Vases or other articles blown in wood moulds are not so clear as hand-blown. This firm exhibits a great many articles, which for form and taste are worthy of great praise; but the large pastes "stuck on" destroy the beauty of the contour produced by the blowers, being opposed to the principles of vigorous and good design.

T. Stergerwalds, Bohemia, has beautiful examples of flint and coated work. A large vase flashed with blue on flint, the blue cut through by the engraver; the subject engraved is the vine, with its fruit, leaves, and tendrils. The vase is well made and engraved, and has a grand effect. Two goblets in the Venetian style, with filigree introduced, are deserving of great praise; the colour of the flint "metal" is good.

Meyrs Neffe, Adolf, exhibits a light service of engraved glass, well made; the engraving introduced on it artistic, beautiful, and in the Byzantine style; the "metal" is good. This manufacturer has a great variety of colours, well blended. The "stained" glass is here conspicuous and excellent in colour; the "ruby" stain good. Nobody but a judge would know but what the glass was coated by "flashing."* It matters not how common the flint glass is from which the articles are made. It is singular in England we do not make glass which stains so readily as that of the Germans. There are some colours we cannot get by staining, and those we do get are not so successful as those produced by the Germans. Their "metal," is better fitted to take in the stain or oxide of metal used to produce the splendid colours. We in England cannot come up to it; but in metal, where lead is used in its composition, the stain does not insinuate itself so easily; this is the reason why we in England cannot stain so successfully the beautiful amber and other colours the Germans produce.

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* "Flashing" means, when the colour in its full depth would be too opaque or dense, a thin cup or case of coloured glass is placed over a base of flint glass in the course of the manufacture of the article. During the operation the coloured glass case is spread by the workman all over the flint base.

Monitz Wentzel, Breslau, Glass Manufacturer to the King of Prussia.—His examples are light services, blown chiefly in wood moulds; "wines" cut off at the "lips." There are some specimens of "sheared" work among the examples shown on this stall, but not well made. Engraving, where introduced, is beautiful and tasty, not over crowded; style of ornament introduced, Greek, "fret," or "labyrinth," beautifully executed, which has a charming appearance. He also exhibits some designs in cups, salvers, &c., of great beauty. His dessert dishes are very light, though blown in wood moulds.

Harrach Gaff, Neuwell, Bohemia, shows two large vases in white and flint; the white is "dipt" in water, thereafter coated with flint, which gives them the appearance of marble; they are afterwards jewelled (the jewels, or paste, being attached by cement) with ruby or green. Portraits of the Emperor and Empress of Austria are painted in enamel on the fronts of these vases (they are each five feet high); the handles are formed of easy and artistically worked scrolls; they are not made with the vase, but are riveted to the body and neck. These vases stand on pedestals of glass. There is also a twisted tankard, which has been blown in a mould, with the representation of a goat introduced on it, and then enamelled with black and white to represent the hair.

Some estimate may be formed of the extent and importance of this establishment from the large quantities of work exhibited, as vases, tazzas, compotiers, liquor services, toilet bottles, claret jugs, all executed in flash colours, as white, ruby, flint, and all richly cut or decorated with gold; they are splendid illustrations of Bohemian glass manufacture. This manufacturer exports a great quantity of green glass of every description into England. Much of the flint glass work is over crowded with engraving, representing figures not very graceful. He has made great progress, especially in the "shearing" the tips of "wines," tumblers, and other articles.

Franz Patline, König, and Co.—On this stall are selections of cut glass toilet bottles, decanters, and scent bottles. The scent bottles are cut in raised diamond patterns, well cut and polished. The decanters are remarkable for the peculiarity of their design. There are many angular cut decorations, which gives the fullest amount of prismatic beauty of which glass is susceptible. This firm produces and exhibits the best flint glass in the Austrian Department.

Andreas, Luglus, and Son, Bohemia, exhibit a large mirror glass (cast plate), 12 ft. by 6 ft., 1⅛ of an inch in thickness, which is a splendid specimen of mirror glass; also coated blue and ruby glass in sheet. This house is one of the most extensive in Bohemia; their mirrors are very clear and free from spots, and are well silvered. The sheets of plate glass they exhibit must have been produced at a great expense; there were no flaws visible, as there generally are in such large plates as those exhibited by this establishment.

Edward Vopelius, Subzbeach, has an extensive display of shades, milk pans, and good coloured bottles for wine; his round shades are very large, the oval shaped not so large. They are not so clear or so beautiful as I have seen in England. The milk pans are well made, nicely designed, and are the best examined by me in the Exhibition.

Wisthoff and Co., Königsbull.—This firm shows samples of shades, champagne and other bottles of a light cold green, but of a good colour. Their shades are not equal to those of English manufacture; but their bottles are more graceful in shape, and there is more finish about them.

FRENCH DEPARTMENT.

The glass exhibited consists only of samples of sheet glass blown in cylinders, 10 ft. long and about 12 in. in diameter. Professor Archer directed my attention to these cylinders, and led me to understand they were produced by mechanical means used in blowing them; they are beautifully cylindrical, and are of the same thickness throughout. The shades the French exhibited are well blown, clear, and large; the milk pans shown are well made, some of them made so that you can get a firm hold, by the maker attaching a piece of glass on each side under the welt.

AMERICAN GLASS.

In this department there are some splendid specimens of show glasses for exhibiting seeds and confectionary; also, bottles for containing drugs. They are splendid examples of glass blowing, the designs good, and the several articles well made. I should like to have examined some of their table glass, but there was none exhibited, and only a few examples of "pressed"* glass (but not exhibited by a manufacturer); these consisted of wines,* goblets, and a few jugs. The show-glass covers were well made, some of them produced by pressing the heated glass into metal moulds; the colour of the metal is good.

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* "Pressing" consists in the application of a press. Large moulds are hinged together, when closed; heated glass, in a semi-fluid state, is introduced into the mould; to the screw of the press a plunger is fitted, representing the

Large sums have been expended by the Americans in the invention of presses and machinery to press the semi-fluid glass when heated. The glass-pressing process has revolutionised the whole system of the flint glass manufacture; many of the articles produced by pressing closely resemble cut work, only the practised eye can detect the difference. The tendency has been so to reduce the cost of glass articles that its consumption has increased tenfold. The Americans claim the invention of the machinery employed, and I believe they were the first to produce articles by pressing. The process has absorbed the surplus labour in the glass trade, and some of the makers prefer it. Having directed attention to the leading exhibits in the foreign countries represented, I now turn to those in the English Department of the Exhibition.

English Department.

Pellatt and Wood exhibit splendid articles of manufacture in glass: a delightful service of light wine glasses, decanters, claret jugs, dessert dishes, of entirely new patterns in form and ornamentation. A lightly cut service is beautiful, producing, by skilful cutting, the splendid natural prismatic colours. The engraving on the decanters I cannot speak too highly of. A large water jug and basin in flint glass is beautiful in form and cutting, a splendid piece of workmanship. This has been executed in a very masterly manner. There are some "wines"* nicely made, very clear, and good in colour; also some bowls with corkscrew stems, lips well sheared, and turned out like print. It is in examples such as these the difference shows itself between the English and foreign glass. The jugs and clarets are well made; there is vigour and form in the outline, and each and all are creditable to those who produced them.

Edward Moore and Son, Newcastle.—The whole of their examples exhibited are pressed, the design and colour good. Dessert dishes roughed after pressing, showing the ornament of the ivy plant, is introduced; the dish is "roughed" on the

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interior of the vessel desired. By the action of the screw the plunger described compresses the glass into every cavity of the mould. On the mould being opened, and the plunger withdrawn, a perfect vessel is produced.

* "Wines" and "wine glasses" are synonymous terms, the former being a term used by manufacturers and artisans in the glass trade.—Ed. *B.A.R.*

surface with sand; the ornament being in intaglio (or sunk), is left bright, and looks well. These are the only English manufacturers who exhibit pressed work, which is well got up; the designs are creditable.

Daniells' (of London) display is remarkable, not only for much grace and elegance of design being shown therein, but their flint is also pure. A beautiful flower vase, with three twisted rings, pieces of plain glass run round the holder, pinced leaves and turquoise berries introduced, is splendid to look upon, a masterpiece of artistic skill in design and make. The "motif" is inspired by Venetian examples. There is a flower basket executed in crystal glass, the design easy, the work well done; the joints of the handles are concealed by a mask. There is also a service in flint glass, of a high order; many of the pieces are skilfully made. The engraving, where introduced, is well designed, and executed with great care. One of the first principles of decorative art is that ornament must hold a place subordinate to utility, and when it interferes with utility it is misplaced and vulgar. The exhibits of Messrs. Daniells hit the right mark; while they are beautified by ornament, it does not interfere with their use.

James Green, London.—This is one of the most important collections shown in the English Division; the objects are made of the purest crystal glass, most elaborate and artistic in style, the forms chiefly copied from the antique. The "wines," jugs, decanters, saltcellars, sugar-basins, are excellent. The flint service, ornamented by what is called in the trade "hobnail cutting," is a great success; has been appreciated and purchased by Professor Chandelon, of Liége, Belgium. A large goblet, engraved and mounted in ormolu, the centre of stem an oblong piece of glass faceted, is also a success; it was purchased by Justigrath Ahlemarm, of Berlin. There is also a chalice worth attention; it is mounted in ormolu, has a cover with a glass cross on the top. The ruby-coated "wines," decanters, and finger-cups, &c., artistically cut, are equal to any shown in the Exhibition. A great many of the jugs, very well made, are engraved in the Greek, Roman, and Renaissance styles. The chandeliers exhibited by Green are excellent; many of the pieces of which they are composed are faceted very skilfully. He also exhibits many good specimens of flower vases.

Copeland, London.—This firm is well represented in glass by a few of the most elaborately decorated vases and jugs, dessert and table services of every description. There is a jug in the Greek style, graceful in outline, with floreated decorations and antique enrichments. An oval crystal vase with two handles, the handles not so artistic, having been attached by two pieces of metal. It would have been better had this vase been made out of one piece of metal, as there would have been no difficulty in doing so. The engraving is a masterpiece of skill. It is a question whether such a piece of work has ever been produced in modern times in this country, perhaps not in any other. It was designed and executed by Paul Oppitz,* and took him 243 days to engrave. It ought to be considered a triumph of industrial, artistic skill, and has been purchased by Sir Richard Wallace. The works of this well-known firm in glass are high in reputation, the colour of the glass splendid.

It is to be regretted England has not made a better representation of her glass trade. A debt of gratitude is due to the manufacturers named for upholding its reputation, especially in its speciality of flint glass of unequalled purity and brilliancy, well cut, well blown, and skilfully decorated with engraving. But the glass the English exhibitors display is not confined to what has been alluded to ; some excellent examples are associated with works in metal as those of

Elkington and Co., Birmingham.—The glass exhibited in connection with the silver and electro-plate of this firm combine admirably with their metal mountings.

Winfield and Co., Birmingham.—The glass shades intro-

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* The announcement of this vase brought to light an English example of equal excellence, the difficulty attendant on its engraving being increased by its being executed in "relievo," whereas that by Oppitz is in "intaglio." The English vase is the work of Mr. Northwood, of Stourbridge, Worcestershire, and occupied his leisure for the long space of nine years. It is 18 inches in height, double handled, amphoral in form; the "relievo" decorations consist of the reproduction of the friezes of the Parthenon at Athens (Greece); these have been copied with great accuracy, spirit, and freedom; the relief of the equestrian figures is very considerable, the details well worked out. The other parts of the vase are exquisitely adorned with Greek ornaments of the most varied and graceful character, produced by etching, in which the engraver of the vase is an adept; also the delicacy and symmetry of the etched ornamentation is admirable. The healthful stimulus of a work done by an English engraver on glass is calculated to encourage effort and emulation to excel; the perseverance is to be admired which animated its producer to expend his leisure time with so much earnestness, and is another example of "doing the work for the work's sake," of which there are too few examples now-a-days, but is the means, the only means, by which success can be achieved, — the feeling which animated the Cellinis, Matsyses, Vischers, Pallissys, &c., &c., whose names are inscribed high on the bead-roll of industrial art. The vase is now the property of Mr. J. B. Stone, of the Union Glass Works, Birmingham, who has permitted me to transfer a representation of it to these pages, and has also contributed liberally towards the expense of the wood-cut introduced, executed by a local engraver on wood, Mr. Ordoyno.—Ed. *B.A.R.*

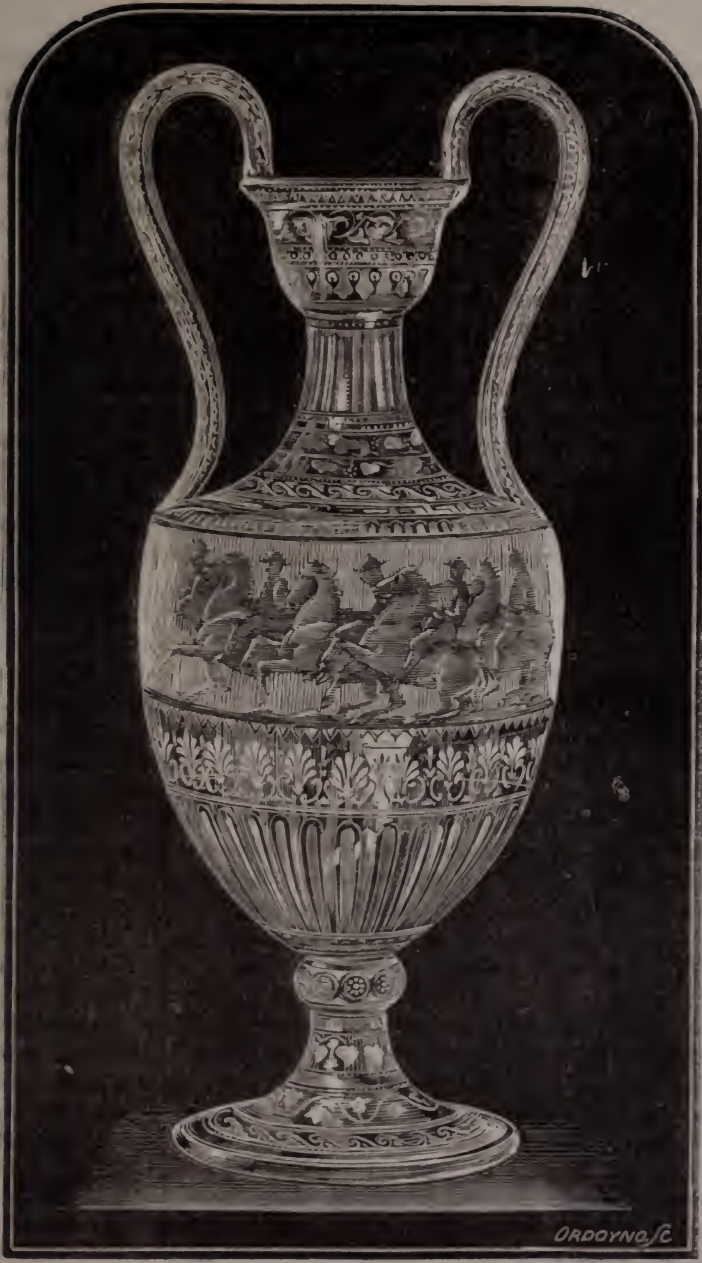

Fig. 47
Glass Vase engraved by Mr. Northwood, of Stourbridge, Worcestershire, England.

duced and associated with the well-made gas fittings of this firm are of the highest order; they are not to be matched in the Exhibition. The exhibits of Messrs. Blews and Sons, C. J. Phillip and Son, and Best and Lloyds, all show good examples of lamp shades introduced. The German-made shades are greatly inferior to these in every particular.

CONCLUSION.

In concluding my Report, taking all the glass exhibited, it is my intention to draw a distinction between that of the various nations as to their progress in the art of glass-making. I believe no nation has advanced in the art of glass-making more than Russia since the Paris Exhibition of 1867. Some people will say, "Well, there are many of the French and German workmen in glass who have migrated there." What matters? If that country gives encouragement to them, it is training her workers in glass. We in England have done the same, and our glass trade has greatly advanced in consequence. China exhibits beautiful specimens in glass of various colours, and some of the best glass buttons I have ever seen. The glass of Roumania is very inferior, still it is putting forth a claim in the glass trade. Greece and Portugal are very low in the scale; we have nothing to fear from that quarter. The whole of the German States have greatly improved in the production of glass, as they have brought to bear on it all their ingenuity and skill. I consider they have made a great advance; it is the nation we shall have to contend against, especially in the styles similar to English work. Some of their common wine glasses are good, and "sheared" on the lips, and sold cheaper. But the best of the glass blown in the usual way is very little cheaper than ours, accounted for not because the work is produced cheaper as regards the blowing department.

But it is not so much a question of wages which renders their glass cheaper, as how their glass is produced and its mixture. They use no lead in their glass, and sell by the dozen or in pairs. Some of our articles are sold in England by weight in great quantities. The making of their glass does not require the same amount of heat as ours, being made softer. They use peat, wood, and coarse slack as fuel in their furnaces, which gives them a great advantage over us. It is no use denying the fact, they are treading close on our heels; but plenty of their work is sold which our manufacturers would not let go out of their warehouses. People buy German glass simply because it is cheap. Our position to-day as glass-makers is far superior to that of any nation on the Continent, but the facilities Continental glass-workers have are greater than ours. Their general education is very much better; there is not a working man who does not belong to a guild (especially in Austria). They have also courts of arbitration to settle trade disputes, and institutions in which the education of the working man is kept in view. Take, for example, the Venetian workmen in glass: it is impossible to say too much of their superiority as shown in the beautiful delicate forms they produce. As Englishmen, we can see the improvement we have made by adopting the Venetian style; the more we practise it the better we get. English manufacturers are now producing everything that is useful without putting the least engraving or cutting upon it —a certain proof the Venetians were right. English artisans in glass might have been equally as good, had they commenced by working glass into ornamental instead of useful forms. By energy and perseverance the English artisan has done wonders, but the art training the people on the Continent receive gives them the advantage over us. The progress made through our institutions has done a great deal. Artists, or workmen in glass, may produce excellent designs, but they will avail very little unless the taste of the public is sufficiently cultivated to appreciate them. We are beaten by the Continental nations in design. They are trained from their youth upwards to know the various styles of outline and ornament, and to adapt the latter to suit the outline of the articles required to be made. The German engraving is beautiful and chaste, but the cutting is not so good as the English. There is one element in favour of the English cutter: the English glass is softer in "nature," but harder and more brittle to the blower when he is working it; foreign glass is softer to the blower, which makes it harder to the cutter.

I must add, I should have liked to have seen more English glass in the Vienna Exhibition. We are the first nation, so far as flint glass is concerned, having achieved the production of crystal flint glass of such purity that no other nation can approach us at present. My advice would be to keep to the "flower" and ornamental work. I feel convinced the more we practise it the greater will be our trade, because the foreigner cannot blow these things in moulds, and the more our manufacturers introduce and cultivate "blowing without moulds" the better. It ought to be the duty of every artisan connected with my trade to do all that is in his power to elevate his trade.

By the application of capital and skill, by perseverance and hard work, we have won our position in the glass trade.

I felt greatly disappointed no French table glass was exhibited; for what reason I could not ascertain.

I am glad to see the youths of to-day attending our schools of art. It is the duty of our Government to give us every facility in this direction, and to open all our museums when the working classes can visit them to examine and study the works they contain in fine and ornamental art.

Having made as careful an examination as time would permit, and endeavoured to write an impartial Report, which I now submit to the Birmingham Chamber of Commerce, by which I was enabled to visit and report on the works in glass at the Vienna Exhibition. I received much instruction by the visit, for which I am very grateful. The lessons I have learnt, and the hints I have received, I will put into practice in my trade. This I conceive is my duty.

Buttons and Small Wares.

By S. WALL RICHARDS, *Manager of Button Works* (*Associated Reporter*).

THE exhibits of buttons in the Vienna Exhibition were so scattered through the building that it was with the utmost difficulty they could be found, suggesting by contrast the superiority of design and arrangement of the Paris Exhibition, 1867, where a systematic classification and arrangement side by side (the same products of different countries) could be studied and compared with ease. The Commissioners of the Paris Exhibition also prepared and set forth in the official catalogue statistics of the numbers employed, rate of wages paid to men, women, and children, and the number of hours worked per week by the operatives in this trade. All this was wanting in the Vienna Catalogue. As might be expected, Austria makes the largest display of buttons in the Exhibition, showing considerable improvement upon her exhibits at Paris, 1867, especially in the manufacture of pearl buttons in large sizes. Fashion may have given an impetus to this branch since that event, but it is significant that the French manufacturers, who exhibited and excelled in this specialité in 1867, do not now show a single case, or section of a case, of pearl ; in fact, their exhibits are singularly free from any examples of what they may be doing in this branch ; it is, however, very suggestive of the monopoly now enjoyed by the Viennese in their own markets. Climatic influences affect the demand for pearl buttons in the South of Germany —ladies' light summer walking-out costumes are more extensively worn, upon which pearl buttons are lavishly bestowed for use and ornament, in sizes from 30 to 50 lines, black pearl to some extent being also used. Military buttons are an important feature in all the Continental exhibits ; the greatest advance made in this class is observable in a Russian exhibit. Russian military buttons shown at Paris were crude and roughly made, showing particularly unskilled die-sinking ; the present exhibits indicate a considerable improvement, which may be accounted for by Russian manufacturers taking from their neighbours more skilled workmen. I do not think it possible that native labour can have been trained to the pitch of excellence here shown in the time. Another class of button that figured largely at Paris has disappeared, viz. a composite article of glass and brass, the centre glass, the outer rim in various coloured metals. These were extensively worn a few years since; they seem now to have gone out of fashion entirely. France maintains her reputation for skill and taste, and makes a fine, if not so extensive a display as at Paris in 1867. Italy is either not fairly represented, or she has undergone a metamorphosis; the only exhibit, that of Edoardo Taccini, Milan, led one to believe that the buttons shown in this case were of German manufacture. There were not any of the grotesque examples shown at Paris. Sober colours in horn, Florentine, pearl, bone, and vegetable ivory, prevailing. There was one English exhibit only of buttons, that of Messrs. Smith and Wright, Birmingham.

Glass Buttons.—Bohemia sends a large display of glass buttons without the names of any manufacturers attached, simply "Bohemia." The variety and excellence of the examples shown is indicative of a different system being pursued in this branch; the materials are brighter and better. The excellence of the glass, in the first place, being evidence of a desire upon the part of the Bohemian glass-makers to cater for the wants of the humble button-maker. I could not ascertain if to any or what extent glass button-making was carried on in connection with other branches of glass manufacture that has made Bohemian glass famous. In England, the glass button-maker is thrown entirely upon his own resources; he is invariably his own designer; the poverty of outline and crudeness of form in the shape of his button moulds is the result of his want of a knowledge of drawing, even of the simplest kind: this, combined with the difficulty experienced by the English manufacturer in supplying himself with the raw material of equal excellence with that of his German competitor, will, to a considerable extent, account for his inability to hold his own, and why a very large percentage of the glass buttons sold in this country are of German and French manufacture. A glass button does not afford (so one would think) any great opportunity for design: the Bohemian case contained upwards of three thousand different patterns. I called the attention of a skilled English glass manufacturer to them, when he replied, "They could be made" (i.e., copied) "in England by some two or three individuals, with an effort." In Germany they are produced by hundreds of artisans, and sold at a price so low, that the English workman is bewildered. This would imply facility, great facility, in their manufacture, and suggests to my mind the control and co-operation of those engaged in the superior branches of glass manufacture, even if glass button-making is not actually affiliated to the higher branches.

Military Buttons claim a very large share of attention from the Continental button-makers. The demand for this class of button is always large and regular; these buttons afford the best test of the skill of the button die-sinkers of the different countries. France deservedly stands highest with sharp, clear designs, effectively worked up, though often only simple in their arrangement. Messrs. Smith and Wright, of Birmingham, make a considerable display of this class of button, very fairly representing the average excellences of English die-sinkers. There was more uniformity of merit in the exhibits of all the Continental makers in this class than of any other, the stimulus to excellence probably arising from their universal use, and encouragement given by each of the Governments to native labour.

Pearl Buttons.—This class was largely represented by all the German makers, in its various branches; the particular excellence of the large sizes, say from 30 to 60 lines, consisted in the very bright surfaces; they were as clear and as brilliant as crystal glass; the turning of the numerous designs was good. In shirt pearl, English manufacturers are superior; the best German patterns were copies of Birmingham made articles. While the demand for pearl buttons has steadily increased for the last few years, the numbers employed in Birmingham (the seat of the button trade in England) has fluctuated in a very curious manner. For many years the trade has been good, but the restraint imposed by the trade union that governs this branch has had a baneful influence. In 1853, the society numbered 1,000 members, without women and boys; in 1867, 1,200 members, without women and boys; in 1871, 864, including boys, but not women. I believe the number has increased since, but certainly has not gone beyond the strength of 1867. There are supposed to be about 150 non-society men. However brisk the demand may be in this branch, manufacturers have no means of meeting it, hence surplus orders go abroad: this will probably account for the great development of it in Germany, where trade is not so hampered.

Perles.—There was but one exhibitor of this particular class of button, Bapterosses, France. There were no new developments of this button, and as they are less worn than ever, except in the small sizes for shirts, which will probably never entirely go out, it is possible we may neither hear nor see more of them after this Exhibition closes.

Linen Buttons.—France is represented in this class by Parent and Co., Paris, with a few elaborately made half-ball buttons in best white cloth, rather illustrating what can be made than what are made and in regular demand. A few German makers show samples of flat linen buttons and eyeleted, wretchedly finished; they have not made any advance in this branch since 1867. Birmingham in this specialité stands pre-eminent for excellence and cheapness; the same remarks apply to Florentine buttons.

Brace Buttons.—Every exhibitor of buttons shows samples. France takes the palm for expensive and chaste designs, principally four holes with raised letters, the groundwork either plated or gilt, the letters oxydised black; this is done by gilding or plating the button, and then taking the gold or silver off the surface by the application of a "lap" or "bob," oxidising afterwards the new surface. If letters were sunk in a solid button, the effect by the above treatment would be reversed, viz., white letters and black foreground. The finish on all the French buttons was very neat and clean, showing truthful die-sinking brought well up by stamping; the majority of the other exhibits were the reverse, inaccurate in design and slovenly in finish.

Horn Buttons.—J. Hill und Söhne, Austria, exhibited very fair samples of horn buttons. In this case examples of wood buttons were also shown by them, the latter similar in shapes to those made in England, but with surfaces as smooth as glass, and the blacks shining like jet. There were not any others that require notice.

Livery and Crest Buttons.—Most exhibitors of metal buttons showed samples of the above. This is the fine-art branch of the button trade; the merits or demerits of a "crest" rest almost entirely with the die-sinker, who should not only be an accurate draughtsman and skilful manipulator, but possess also a considerable acquaintance with heraldry. The French have taken up this branch and lavished time and talent upon it, adding to excellent die-sinking the charm of colours as shown in imperishable enamels. I ventured a prediction in reference to this class of buttons shown at Paris, in 1867, to the effect, that, like the Cæsars, who live on Roman coins, the Imperial régime of France might pass away, leaving nothing behind but "buttons" in imperishable enamel to record the past. Imperialism has gone; the buttons remain—the same that in 1867 revealed to the world at large the remarkable development of this branch of the button trade. Other nations, exhibitors, both then and now, are immeasurably behind the French, and seem likely to be, notwithstanding the less ostentatious rule of the Republic, under which we may not expect much future encouragement to this adjunct of the trappings of the court and royalty.

Steel Buttons.—There were no exhibitors of these buttons; they appear to have gone out of fashion; though at Paris, 1867, there was a considerable display.

Upholstery Buttons—or more properly nails, for though, as shown in the case, they appear as buttons, they are attached to furniture with a nail that is soldered inside or at the back of the shell. Examples were shown gilt and plated, and plated with oxydised surfaces, the designs all of a geometrical character, so that, however arranged upon furniture, they would always appear regular and harmonious. The effects produced were pleasing from a judicious balancing of bright burnishing on perfectly level surfaces with dead or frosted interstices, or background; whatever kind of ornamentation was adopted, this rule was adhered to. These very interesting examples were in the French Court, and arranged with great taste.

Vegetable Ivory Buttons.—There were several considerable exhibits in this class, very similar to English-made goods. The only novelty I observed was a button in various sizes mottled in different shades, with stripes upon it in a different colour: the stripes radiating from the centre, either forming a star, or dividing up the surface into segments.

SMALL WARES.

It would not be very difficult to enumerate the staple trades of Birmingham, and the number of persons employed in them; it would, however, be a laborious task to ascertain the number of trades carried on in the town that are not staple, and their ramifications, with the thousands of persons employed in them, that properly come under the designation of Small Wares. Kings and rulers take no note of them; almost ephemeral in their existence, they rise up, exist for a short period, and die, never more to be heard of. Often called into existence by the fancies of fertile minds, or the fickleness of fashion, they afford, to the energetic or the capable, means of existence for a period, to be succeeded by something else as transient; the student of exhibitions of manufactures should be alive to their changes, if anything really good is to follow them. What are small wares? They comprise all the little articles that are the necessaries and luxuries of life, in whatever materials these may be made; I purpose enumerating but a few, and only those that presented themselves to me as likely to be of profit or interest to the producers of the Midland Counties.

Since the Paris Exhibition of 1867 a new trade has sprung into existence, only to be a monopoly with the French and Germans, I mean the manufacture of small wares in tortoiseshell and gold, such as brooches, earrings, charms, lockets, portmonnaies, card-cases, &c. These productions must be very familiar to everyone; they have had an enormous sale throughout the length and breadth of Europe, and especially in England; it is now waning. English manufacturers have not enjoyed, except to a small extent, this prosperity, simply because the art knowledge and manipulation of tortoiseshell is so little understood by them that they could not avail themselves of it. The popularity of this new material for small wares consisted mainly in its being so much in harmony with the tastes of the people of England and the cities of the Continent. Gaudy colours in ornaments are eschewed among the better educated of all classes, especially when they take the form of the articles enumerated above; black, brown, or black and white, have the greatest number of patrons. Black vulcanite small wares have had an enormous run, on account of their resemblance to jet, and greater cheapness. This new trade has taken root in Birmingham, has thriven, and is now declining; its application has been more extensive than tortoiseshell and gold; guard-chains and bracelets for ladies have been extensively made in addition.

In Paris, 1867, many French exhibits contained small wares in imitation of "oxydised silver," such as brooches, sleeve studs, watch guards, charms, and walking-stick handles, match boxes, letter weights, necklaces, &c., &c. These were to be seen exposed for sale in England soon after the Exhibition closed. The demand was slack for a time. The English public now, however, are becoming familiarised with these productions; and in consequence they are now exposed for sale in every tradesman's window where this class of goods are sold, sufficient proof that foreign manufacturers are stealing a march in this particular.

Russia exhibited small wares in Paris, 1867, in "niello" card cases, cigar cases, lockets, &c. Considering for how long a period gold and silver, with the different changes niello has been made to appear in them when intermixed with gems, &c., it is not surprising that the astute foreigner should seize on niello for a change and as a novelty.

Articles in niello are black and white, silver really, with the prettiest designs. The difference between niello and black enamel consists in its toughness and its not being brittle as enamel, and the black does not present the brightness that makes enamel work so objectionable, if used in masses of ornament, it has also an additional merit of improving by use. In the Austrian Court there was a unique display of small wares in niello, consisting of châtelaines, suspenders for ladies' fans, bags, watches, or umbrellas, seals, watch guards, lockets, solitaires, knife handles, walking-stick handles, purses, card and cigar cases, umbrella mounts, &c. The ornamentation of the smaller articles was invariably in geometric patterns, as the honeycomb, or diapered, made from sheet silver, or plated metal, with designs rolled on it; in others the patterns were stamped. A peculiarity of the niello was apparent from its being bent into half a circle without its chipping or cracking on the raw edge.

If the art of niello decoration is ever to take root in Birmingham, Sheffield, London, &c., it will have to be developed much in the same manner as the application of electro-gilding, applied to small wares, has been. Some firm, as Elkington and Co., will have to do for this process (new to England) what they have done for extending the use of electro-gilding—viz., offer their services to the numerous small ware manufacturers, and undertake to niello anything that may be sent prepared for the process, as they now undertake to electro-gild, electro-plate, or bronze thousands of the different productions of Birmingham every week. If some such arrangement can be made, a large and permanent addition to the resources of Birmingham in the small ware trades might be anticipated. If this new branch of industry should take root in Birmingham, I see no reason, with the varied purposes it can be put to, why an increase in the prosperity of the town should not follow, and a more general diffusion through the country at large of trinkets or ornaments of dress, in better taste than those now worn, and of a more elevating and durable character.

Thimbles.—This is a branch of industry in Birmingham which has a good deal of permanency in it, but not much of progress. A real small ware, circulating through the length and breadth of the land, found in the palace and the cottage, a thimble might be made a medium for disseminating simple but correct ornamentation, without enhancing its prime cost to any very appreciable extent. One Birmingham firm has improved this manufacture very much. Durability and comfort—the former by introducing steel in the crown of the thimble, on account of its durability, the latter by enamelling the inside—are devices for accomplishing thereby what are considered essentials in thimbles.

In the Vienna Exhibition there was a case of thimbles, not at all equalling Birmingham-made goods, so far as finish and shapes were concerned, but there was a novelty introduced in the crown of the thimble in the shape of glass, instead of our steel tops. The glass being of various colours, had a pretty effect in contrast with the silver; the hardness of glass must also be a great recommendation in its favour. In the common class of thimbles this novelty could not be introduced; the examples shown were real silver. This was the only novelty in connection with this exhibit. There was the usual mistake made in ornamenting the rim of the thimble we see at home; pieces of wire were soldered on the outer edge, bent and twisted in various forms to imitate scroll ornament; these were chased, so as to present a serrated edge, as we see in lockets sometimes; of course not always left smooth; the wire being indented with the chasing tool, cannot always be quite smooth: the consequence is ladies say they do not like thimbles with fancy edges, because they impede sewing by catching the thread or cotton. Thimble decorations should be surface decorations, as smooth as possible, presenting no projections, irregular surfaces, or edges; this has not been done to its fullest extent in the samples alluded to. There are innumerable engraved and impressed patterns, but there is no process or method of ornamentation that offers or contains within itself all the essentials without drawbacks equal to "niello."

Hooks and Eyes.—A case was exhibited by a Spanish house of hooks and eyes, unlike anything we see in England; these were all bright (doubtless preferred so for the Spanish market; they would not be appreciated out of it), made of fancy wires; they underwent a flattening process to give them the appearance of "swan bills," afterwards to appear in a variety of bright colours, as brilliant blue, green, and red, with several shades between. If this is a peculiarity of the Spanish trade, the English hook and eye manufacturers have only to study it to obtain a monopoly; the hooks were so badly made, that it appeared to rest with the colouring who supplies Spanish wants with this article. Birmingham goods are immeasurably superior.

Needle Cases.—At the Paris Exhibition it was demonstrated beyond all dispute that for needles combining quality of material, clearly pierced and well-fashioned eyes, elasticity of temper, points, &c., the productions of this country are unequalled. Satisfied with their triumph on that occasion, attention appears to have been given since by one Redditch firm (Messrs. W. Avery and Son) to the creation and development of a new few feature in connection with needles, viz., the construction of elaborate, ingenious, and ornamental needle and pin cases. The stall of this firm in the Exhibition looked more like a gilt jewellery dépôt than anything else. The idea carried out by them (which is patented) is capable of extensive application to other trades; though all the credit is due to them in its application to their own trade. We are all familiar with the ordinary papers in which needles are wrapped, packed, and sent away; how, to open a packet was probably the preliminary to scattering them on the floor! Now, by some twenty-seven different contrivances, patents, and registered designs, Messrs. W. Avery and Son have created a new industry in the Midland district, and added to the ladies' work table an elegant and useful object. These cases are strong, in addition to being ornamental; they demonstrate the feasibility of an article of commerce being made, and that extensively, as a covering or case only for something in universal use, of little cost in itself, while the case will be perhaps double or treble the price of the article it contains. The idea was a happy one, and has succeeded doubtless beyond all expectation.

The ingenious cases, with easy motion for raising the needles, or shutting them up again, are simply beautiful in their action, but are so numerous and varied that a description of their various "actions" would read like a book of the specifications of patents. The novelties are now so well known that to enumerate them is sufficient. The "hedgehog" pincase costs a thousand per cent. more than the pins it contains—a gilt ornament to represent the animal, the pins stuck in little perforations left in the back; the "butterfly,"—the needles concealed under the wing; and there are about twenty-five other varieties, all differing from each other. If a lady's work table can be supplied with these little elegancies, or novelties, in which cost is not the prime consideration, why not go a little further, and provide something more elegant or durable, viz., needle-cases in "niello?" Smooth surfaces should be presented upon a work table, and always in connection with sewing and embroidery, especially when we consider to what a great extent needlework is the accompaniment of ladies. It is not at all uncommon to see ladies tatting, or at some other similar amusement, when travelling; how essential it is, then, that these necessaries should be easily put away or brought into use. Why too should not steel pen-cases, or elegant little caskets, oxydised, or ornamented in "niello," become as fashionable, as useful, and ornamental as needle and pin-cases. I throw out these suggestions for the pen trade, and can see no reason why it should not be adopted.

Spectacles.—Capricious fashion has given an extraordinary impetus to this branch of industry. It may appear singular at first sight that a failing attending increased age should be assumed by the youth of the Continent of Europe (more especially by blooming girls from seventeen to eighteen years of age and upwards). I was struck with what appeared to me the unusual number of young persons to be seen in Paris, in exhibition, and on the boulevards, using the kind of spectacles called "folders," only used in this country by persons of advanced age. The same peculiarity was presented at the Vienna Exhibition; it would be absurd to suppose all the young persons using them were really near sighted. For out-of-door display the folder affords an opportunity for showing a pretty gloved hand; it also serves the purpose of a "domino," giving the user the means of reconnoitring without being recognised; and it is also an indication of taste and social status. Some of these spectacles are encased in pearl, others in ivory, with flowers carved on the centre of the case; some are of tortoiseshell and gold; many of the latter gold of 18 carat, with flowers in relief on the surface in pale green, or deep red gold, being simply elegant pieces of jewellery.

It may be asked who creates the demand for this class of goods? Paradoxical as it may appear, my answer is the manufacturer. The attraction of the case of the "folder" is, in my opinion, its charm and fascination. In every court of the Vienna Exhibition—French, Belgian, Italian, and German—there were samples of these elegant appendages, made in all the materials named. This small ware is an illustration of the extent to which art feeling and taste may be conjoined with an article whose primary essential is usefulness.

Folders are made and sold to a considerable extent in this country; but what a contrast they afford to those of foreign make! The French have possession of English markets for the more elaborate and highly-finished examples, while home manufacturers are content to produce plain gold rim folders, the manufacture of which they look upon as an achievement.

I did not notice any folders in niello. The smooth surface of the case is a recommendation for that kind of surface decoration; and should the art take root in this country, folder spectacles are among the small wares its application might be extended to.

Conclusion.

The many excellences that characterised French small wares in the Paris Exhibition has been taken advantage of by the

Germans. The productions of the latter could not be compared with those of French manufacturers in 1867, so wide was the gap that divided them. The Germans were feeble copyists. The Vienna Exhibition reveals them now as very close imitators in the more elaborate ornamentation of small surfaces.

The meerschaum pipe has developed in Germany (perhaps, inspired) art workmen. The fanciful carvings of pipe-bowls are proofs of great skill in that department of art. One of the exhibits of richly-carved meerschaum in the "Weltausstellung" contained a very handsome display of ivory solitaires, or sleeve-studs, elaborately carved with a variety of designs, mostly figure subjects. These are essentially small wares; and in an establishment where skill of so high an order was evinced by the carved meerschaums, solitaires must be a small matter indeed, but plainly not too small for careful attention. Instead of the small wares lowering the prestige of the meerschaum carvers, the workmen lift up the small ware into a higher region, and make it a work of art.

This kind of competition small ware manufacturers of this country are not in a position to cope with. Where mechanical appliances alone are required, the inventive faculties of Englishmen seem always equal to the occasion; when artistic requirements make their demand upon the small ware manufacturer, they find him like a ship without a rudder, almost always isolated, though probably working and producing small wares within the shadow of some manufacturer who has a high reputation for art productions, who may be employing modellers and designers, and be disseminating works of high art among the rich and educated. But the small ware manufacturer, whose wares are for the million, should have it in his power to produce something else besides the too often seen incongruities that never called forth a feeling of love for the beautiful. Our great middle class are continually being recruited from the ranks of the multitude; how unprepared many of them are for the change! They should, and doubtless would, become patrons of art work, if they knew how.

At the present moment the English small ware manufacturer fights unevenly with his foreign rivals. I have never yet seen any aids in our modern English towns, nor anything to inspire workmen with a love of art. If a country was threatened with invasion from fifty different quarters, and its Parliament resolved, after careful deliberation, to make provision for its defence by voting a sum of money for the strengthening of its weakest points, what would be said if one only of those places appropriated the whole of the money so voted for its own especial defence? I imagine the conclusion we should all come to would be that it was an unwarrantable misappropriation of public funds.

Birmingham, Sheffield, Manchester, Wolverhampton, and Walsall—these towns especially are threatened with invasion, some of them, in fact, are overrun by the foreigner. Birmingham is particularly vulnerable at more than fifty different points. What means of defence has it? Birmingham small ware manufacturers see in their daily peregrinations foreign art productions staring them in the face and pushing their own aside, and they feel themselves powerless to resist. A large sum or sums of money have been voted by the British Parliament for the purpose of fortifying the country and enabling it to resist, at least to prepare for resistance. The immense collection of objects of art at South Kensington, bought with the nation's money, should be our source of strength, if judiciously applied; but of what use is South Kensington Museum to art workmen here, or in remote and distant parts of the country?

It is wearying to hear of the immense treasures of art that lie hid from want of space in the "stores" at South Kensington. The duplicates and overflowings alone of the riches therein contained would stock large museums in all our manufacturing centres; and yet we are hungering, nay, more, perishing in some instances, for what is our own, wrongfully kept, and perversely denied us.

Paris is France, but London is not England; it is wrong to attempt to appropriate national funds for the purpose of enriching London beyond her needs, at the expense of all the provincial towns. I have known a Birmingham manufacturer send up to London one or two of his superior workmen to spend a day at the South Kensington Museum, for the special benefit of his business; but the thing is impracticable for the town at large. The temper of the provinces has been sorely tried on this art question; there is a limit even to the forbearance of provincials.

Guns and Pistols.

By CHARLES HIBBS, *Birmingham.*

A JOURNEY of 1,600 miles, to a great manufacturing country like Austria, the home of a cultivated, ingenious, and persevering people, whose rivalry galls us in so many markets and in so many branches of our national industry—that journey leading also through other countries (notably Belgium), who are even more formidable competitors with us, and ending in a capital where, in one building, was to be seen the largest collection of labour-products ever gathered together, seemed to promise a grand opportunity for making inquiries and comparisons, social, economical, and industrial. With regard to that particular industry which forms the subject of this Paper, the mere announcement that Liége, the Belgian Birmingham and chief seat of the Continental gun manufacture, was to be taken on the way, seemed to open up a vista of possible research into the conditions, modes, and facilities (natural and otherwise) of production, that should be of the greatest possible importance to those engaged in that industry at home. There would be, it seemed, a chance of seeking out, and laying the finger on, those causes which enabled our closest competitors to outstrip us—now in cheapness, now in quality, now in some new manifestation of ingenuity—ever in one point or other—during the neck and neck race that we are constantly running. Now, it would seem, was the opportunity for discovering, once for all, whether the labour of the Continental artisan was in reality cheaper than our own; whether his natural conditions were such, that he could maintain his working vigour at less cost, or rear a family with less difficulty, than his compeer in England; whether his habits were simpler, or his industry more sustained; whether his industrial training had been more complete; whether he expended his labour with more economy, so as to produce greater results with less means; whether, again, the relations between himself and his employer were such, that clash of interests was avoided, and harmony of purpose promoted, more than with us; whether the operations of large factories were carried on with less waste, because of the more perfect working together of the capital and labour interests; whether there were fewer points of difference on which strikes might arise, thereby diminishing the cost of production by taking out the fatal element of insecurity; also, whether the actual manual operations were more ingenious or simple; whether, and in what degree, saving was effected by modes of work: lastly, whether there was any advantage in the nature of the materials used; whether they were more *workable*, more facile to treat in various ways, more uniform or reliable in their qualities. These points, though by no means all, or even the most important of those that enter into the great question of international competition, are precisely those upon which artisan reporters are best qualified to judge. They would bring to bear upon them the special knowledge of experts, so to speak. Therefore, it would have been of vast advantage if facilities had been afforded for such a research; and to no trade would the advantage have been greater than to that which the writer had the honour to represent. To pursue it effectually, however, would have required several reporters instead of one; for, as regards the manual operations alone, the great subdivision of labour which prevails in the gun trade would have made it impossible to find a man capable of pronouncing a competent judgment upon all branches. But when it appeared that the facilities for examining the peculiarities of foreign gun manufacture would be limited to viewing the productions of the various nations through glass cases in the Exhibition, and when the pleasantly-shadowed-forth visit to Liége resolved itself into a passing view of the city from the carriage window and a stay of five minutes in the station, it became clear that no such inquiry as that here indicated could possibly be made.

The Vienna Exhibition is not nearly so well adapted as the Paris one of 1867 for the purposes of an artisan reporter. That, it will be remembered, was an elliptical building, divided, as to plan, by concentric circles and radial lines. Within the various circles, or belts, were arranged the several classes of products, grouped according to an easily understood principle. Thus, the outer, and largest belt, contained machinery; the next, products of mining industry, forestry, &c., and the next, articles that might be carried or worn on the person. In this group were the portable arms. The radial lines divided the various countries; and the visitor could choose whether he would inspect all the products of one particular country, or one particular product sent from different countries. In the first case, he would proceed from the outside of the building to the centre, passing through the belts one after the other, but keeping within the radial lines which bounded the country he was exploring. He would see all the exhibits of that country arranged in their respective groups, from the machinery in the outer segment to the fine arts in the innermost and smallest one. But if he wished to examine one particular product, or group of products, he would make his way to the belt which contained it, and walk round it, passing out of one country into another. Nothing could possibly be more convenient for purposes of comparison; and the Catalogue and Map of the Exhibition were so admirably clear, that a minute's study of them would enable the visitor to walk straight to any object he desired to see.

The plan of the Austrian building is totally dissimilar. It has one long stretch of Central Hall, or nave, 1,000 yards from end to end, broken only by the Rotunda in the middle. Crossing this nave are a number of transepts, at regular distances apart, throwing out branches from the main trunk on either side. Seen from the top of the Rotunda, the long roof of the Central Hall, with those of its branching arms, form a stupendously imposing sight. The space between these branches is also taken up for exhibition purposes, mostly by large out-door exhibits, which remain in the open air; but not seldom is the space wholly or partially covered over, and turned into an additional court or courts, which may be entered from one of the transepts or from the Central Hall, and thus become a portion of the interior of the building. The result is a somewhat irregular ground plan, in which, with its avenues of glass cases, and miles of counters and partitions, it is very easy to get lost. The countries are arranged according to a rough geographical distribution. Entering at the west end, we find ourselves in the United States. To the left, on the same level, are South America and the Brazils. Passing onward, we enter Great Britain, with her dependencies. Branching off to the right, are Spain and Portugal. France comes next, occupying a good space, in the midst of which is an off-shoot, representing Switzerland. Then Italy takes up a thin line right across. Passing this, we come into Belgium, on the right of which lie grouped Holland, Denmark, Sweden, and Norway. We have now reached the Rotunda, whose immense area—nearly 120 yards in width—is filled indiscriminately with the exhibits of all nations. The squares of courts which enclose the Rotunda are apportioned, half to the New German Empire, and half to Austria; and for some considerable space after we have crossed the Rotunda, we continue to traverse Austria. Then come Hungary, Russia, Greece, Egypt, Central Africa, Tunis, Roumania, China, Persia, and Japan. Turkey and Siam conclude the journey, which brings us out at the other end of the building, having passed from the west to the east.

It will be easily conceived that to explore the whole of so vast and scattered a collection as that which forms the Vienna Exhibition, is no trifling task. Working onward with my plan in my hand, and marking off my progress as I went, so as to ensure that no spot was left unvisited, and that no ground was traversed twice, it took fully two days to go through the main building and its industrial annexes, and to mark down the spots where fire-arms were to be found. I thought it better to do this, in order that I might afterwards go through them on system, and lose no time in comparing the products of one nation with those of another. I will not record the trouble and vexation of spirit which attended this exploration; suffice to say, that I should have done better if I had proceeded on the spirit of the old adage,—"If you want to find a thing which is lost, look in the unlikely places first."

Now, if my gun-making and other kind friends will please accompany me in imagination from case to case, I will endeavour to describe what I saw, and to point out such specialities as my commission of artisan reporter bound me to look for. Entering by the west portal again, we come first upon a good display of arms from

America.

Peabody, Sharp, Colt, Remington, Smith and Wesson, and the Springfield Armoury are all well represented. The first thing which strikes a professional eye is the absence of that workmanlike neatness and finish which we are accustomed to in work of corresponding quality. The military arms, for instance, have an appearance of what we should call "rough work," in comparison with the high-class article turned out from our armouries; and in shape, their clumsy, heavy, even ugly appearance, almost offends the eye. Still, to pass them by with such remark would be to do them great injustice. There is in the American work such an evident adaptation of means to ends, such a direct aim at the *use* to be made of the weapon and its various parts, such a palpable thrusting aside of all considerations but those of serviceableness and durability, that the merest glance below the surface impresses one strongly with the thoroughly practical character of the transatlantic mind. The things may be unsightly, but we feel that they are sound; they may not please the eye, but we know that they will answer the purpose for which they are designed. There is the same air of blunt sincerity and contempt of all disguise about the American work which is said to characterise the Western settlers. It seems to say, "Here am I, just what I appear to be; take me or leave me." A screw head is an unmistakable screw head: that and nothing more. It is not polished off level with the plate in which it lies, nor is it deceptively made to appear a part of the engraved design. It stands up clumsily from the surface, or it lies buried a little below it, just as it happens, and it may, or may not, fit the hole it lies in. But it looks like a good honest screw, and we may rest assured there is a well-cut thread at the other end. It must not be supposed that all the American work is obtrusively coarse. The small Deringer, and Smith and Wesson's pistols are models of nattiness and handiness; but about them there is clearly nothing that is gimcrack; they are weapons, not toys; they are (alas!) for use, and not for show.

Some parts of military weapons, shown in various stages of completion, from the machines of the Springfield Armoury, have the same want of clean finish, but an abundant evidence of sound, rough, serviceable, solid work. Some day or other, perhaps, our American Cousins will begin to pride themselves upon the appearance of their really meritorious productions, in which case the more accomplished of our artisans, of whom, unhappily, there are often many to spare, will be at a premium amongst them.

There are a few guns, mixed up with other matters, in a case here in Brazil, but there is nothing in them to call for our attention. We will get on, if you please, to

GREAT BRITAIN,

Where the whole gun-making trade of the greatest gun-making country in the world is really represented by one firm. There are some half dozen double breechloading shot guns by Alfred Lancaster; a trophy of barrels by the Henry Barrel Company; one or two military rifles by Soper, which are said to have been loaded and fired sixty times in one minute; one or two again by Henry, showing his self-cocking action and side-lock systems; and beyond these few, exhibited as they are mostly for specialities, the burden of sustaining the credit of England, for her extensive and various gun manufacture, home and foreign, falls on Webley, of Birmingham. Other Birmingham guns there certainly are in the Catalogue, but after a weary search I became convinced that they were only in the Catalogue. It is not my province to play the critic on the works of any individual manufacturer. My functions as an artisan reporter limit me, I conceive, to the consideration of such differences of quality, style, construction, and modes of manufacture as are to be found between the works of different nations. But, while carefully avoiding the province of a juror, it is perfectly allowable for me to say, what it would be an unpardonable injustice not to say, that in Messrs. Webley's case the gun trade of England is worthily represented. It is represented, as regards variety, by specimens of nearly all the principal types of arms produced in the great Midland Armoury. It is represented, as regards quality, by a sufficient sprinkling of those high-class weapons, for the production of which England yet stands unrivalled, which combine all the possible excellences of use with the most absolute perfection of finish, and which yet have not about them one single line of ornament that is superfluous or meretricious.

An International Exhibition is the place to see variety of national characteristics. Here you may meet, in the ever moving and changing crowd, types of every section of the great human family. In build, in gait, in feature, in complexion, in costume, striking differences appear, stamping each individual with the distinctive characteristics of his nation. Look around, and you will see the same distinctive nationality of character stamped upon the works that they produce. The Mongol does not differ from the Malay, the Caucasian from the Negro, more than does the character of the work of men's hands differ when seen side by side in a collection like this. There is as much dissimilarity between the craftsmanship of a French *ouvrier* and that of an English artisan as there is between the two individuals: the one light, vivacious, revelling in fancy; the other grave, firm of purpose, not to be diverted from his aim. The character of the mind is impressed, in a thousand unconscious peculiarities, upon the wrought product, as graphiologists pretend to discover it in the handwriting. No doubt types of work, as of men, may assimilate, and at last shade off into each other by such infinitesimal gradations, that the line of division is lost; but we can always recognise the true and parent type; we can always refer undetermined characteristics to an original standard. In handling a gun, for instance, such as these best quality sporting ones in Messrs. Webley's case, we are able to say positively, "This is English." An English sportsman, who wants his fowling piece to fulfil the conditions of good shooting, easy handling, safety, perfect action, and durability, and at the same time would like it to be a possession he could be proud of; in material and finish, the best of its kind; in form and decoration, an object to satisfy the demands of taste; in short, a piece of perfect workmanship from end to end, would here be exactly fitted. If he wanted a work of art, he would not be exactly fitted; but the chances are, that he would rather contemn the notion of a work of art in connection with the sports of the field. If he were a French sportsman, he would want something that would please the fancy as well as bring down game; and then the French *ouvrier* would fit him best.

It is in this sense that I refer to Messrs. Webley's as a good representative collection. The character of the work is just that which is ordinarily to be found in the show-rooms of English manufacturers, and which is well known in the markets to which English arms find their way. It was, I must confess, an occasion of great pride to me to find, in a miscellaneous collection of articles, no doubt taken from stock, and certainly in no sense manufactured for exhibition purposes alone, work turned out from a house bearing no name of old renown, which would bear comparison with the very best of that exhibited purely for show, by the most celebrated art-producing armourers of the Continent.

Messrs. Webley show double and single shot guns, match rifles, military rifles, and revolvers, &c., and an express rifle, the trajectory of which is so low, that it can be fired from 200 to 500 yards with the same elevation of sight. They have also a good display of the serviceable revolvers supplied by them for the Irish constabulary.

Lancaster's small collection comprises double guns in pairs, matched to a nicety. The finish appears to be all that can possibly be desired. From England we next pass into

SPAIN.

Here we seem at once to have glided back into the Middle Ages. The few guns exhibited are such as might have been carried by the chivalric warriors of Castile, when marching forth to do battle with the Moors of Grenada; or such as might have formed part of the ship's stores of Christopher Columbus, in that adventurous expedition which was to result in the discovery of a New World. Quaint, strange, and obsolete are they, as the characters of some old manuscript scroll, disinterred from the muniment chest of an ancient chapter-house. With their long, heavy barrels, barbaric furniture, and stocks queerly curved, the reverse way to that affected by us moderns, they remind one of the primitive weapons carried by our old arquebusiers, who, in the "musketry instruction" of the Hythe of that day, were directed not to aim high, lest their missiles should fly over the heads of their foes; yet to take heed that, in aiming low, the bullets rolled not out of their guns. We have nothing to do with these, for they are shown only as curious *antiques,* and our business is with the manufactures of to-day; so, with a passing regret that we cannot secure them for some museum, we leave them and bend our steps for

FRANCE.

A perfect feast awaits us here. The best makers of Paris are represented, and specimens of those wonderful *armes de luxe,* for which that great emporium of taste is celebrated, are here in abundance. Some of them are old acquaintances, having no doubt travelled from Exhibition to Exhibition since the era of those institutions set in; but others bear the blush of newness upon them, and show that the hand of the armourer artist has lost none of its cunning. I described this class at some length in my Report upon Guns in the Paris Exhibition; and I could now repeat, though the sobering influence of six years has passed over me, the expressions of surprise, pleasure, and deep admiration which they then excited. I despair of being able to convey to my English fellow-artisans a notion of the delicious beauty of these choice productions. They must understand that the motive which inspired their producers was not that of turning out an instrument to shoot with, but an object of art, an ornament for the cabinet, the private armoury, or the museum. I can well conceive an English workman, proud of his craft, and justly so, pointing me to one of the masterpieces of a Richards, or a Purday, and defying me to find anything in the world to beat it. Very well, but here is a gun with more labour and more expense lavished upon its pair of cocks than there is in all that piece. The mere decoration of this gun must have cost hundreds of pounds, not made up by using a lot of gold and silver, but by the value alone of the labour expended upon it. I quite agree with my friend, the workman, that it is none the better gun for all this frippery; but that is not the point. The intention and motive of it is different; and here, my friend, is the distinction between the *idiosyncrasies* of the French and English industries.

Here is a specimen from the case of M. Gastinne Rennette. The stock is surface-carved with tendrils of the vine. That is, from the smooth polished surface of the walnut there rises an elaborate design in clear but subdued relief, carved out of the solid wood, and running along both sides of the butt, in many a graceful line of foliaged tracery, twining and intertwining, as though the fairy hand pictured by the Minstrel of the North had placed it there,

> "Then framed a spell, when the work was done,"

and witched it into solidity. The lock-plates, the guard, the lever, the breech, are all carved—not engraved, but *sculptured* out of the solid steel and iron—into leafage thick and tangled; little animals peering out, or disporting themselves among the undergrowth; and not a form or a line untrue to nature, or out of harmony with the general design. A thievish stoat, with a bird in his mouth, climbs up a forked branch, and this forms the cock of the gun. Fancy the wealth of art-training, and the weeks upon weeks of patient labour bestowed upon a piece of work like this! Then it is parcel-gilt, encrusted, damascened, and decorated in every style known to art metal-work. Yet the whole effect is not that of over-enrichment or gaudiness, as I am afraid it would be, were we to attempt the like. If it has one merit more conspicuous than another, it is that of being superlatively chaste; and that it has nothing false in art about it is proved by the crucial test that not one scrap of the ornamental seems as though it could be spared, or taken away without destroying the beauty and completeness of the design.

Here is another, from the *Atelier* of Le Page. The design is more bold, the subject is larger, and the relief is higher. The figures stand out more from the ground. If it were *repoussé* work, we should say they were detached from the field. Compared with the one just described, it is as the daring, muscular *alto relievo* of Cellini to the low, soft, delicate relief of that great work of Morel Ladeuil. The theme is again sylvan, but incidents of the field and wood, classic and modern, employ the genius of the artist. A stag hunt rushes along the iron work in the body of the gun, to end in the heavy breech. On the strap of the heel-plate, which is carried all round the heel of the gun, a group of nymphs are equipping Diana for the chase. Where the stock is carved, it is cut into bodily—not as in the last instance—with a design as it were superimposed. Again the effect is manifestly harmonious, and in strict fidelity to art. There is nothing overdone, or ignorantly done. Over all there is the impress of that true instinctive taste which is a Frenchman's second nature. If the simile be not too bold and irreverent, I would liken such a work as this to the dress of a Parisian belle, in which everything is so exquisitely in keeping, that each part helps and sets off the rest: in which the richest materials never look vulgar, and the simplest never look common:

in which the fair wearer, in short, looks as fittingly and naturally encased, as does a bird in its feathers, or a moth in its many-coloured coat of velvet down.

Le Page has some pistols, with ivory stocks, inlaid, which are very delicate in their ornamentation. Indeed, the methods of enriching arms are legion : marqueterie and niello work, incrustation, saw piercing, frosting, the association of different metals, besides those which have been named before, and many others which are peculiar and unique. What sort of *guns* they were under all this dress, I could not of course judge by looking at them under glass ; but, so far as I could see, they appeared to be of the best materials, and of admirable finish. Though so utterly different to anything in his own line, I feel sure that any good English workman would linger over them with delight, and would also come away with the idea that there were capabilities in his trade which he had hitherto never dreamt of.

France has also a good display of merchantable arms, mostly from St. Etienne, the principal seat of the trade, where the Government factories are. Three private firms exhibit such guns as are to be found in our gun-makers' shops, of qualities and prices to suit ordinary customers. The chief feature about them is, that they seem to go in for outward appearance more than ours do. Their stocks are varnished where ours are buffed up and oiled; their barrels are eaten up, where ours are plain brown ; their furniture is superabundant, where ours is cut down to just what is necessary. You never see in the French guns any of that affectation of quaker-like simplicity which is becoming the fashion in our best work. Probably with the same eye to effect, the French gunsmith makes a speciality of his "twist." * He produces the greatest varieties of figure ; sometimes in geometric lines as fine and as regular as lace-work ; sometimes a feathery or clouded pattern, and sometimes an *olla podrida* of all patterns in a single barrel. Some of these figures are really beautiful ; others are merely peculiar.

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* "Twist" means the peculiar configurations observable on the surface of the barrels of good and best quality of guns ; is produced by the manipulation of the iron (frequently iron and steel) of which the barrels are made. Used up horse-nails are made up into a "bloom," which is hammered out into a series of narrow, thin strips ; these, being laid over each other, are welded into a square rod. This square rod is twisted into a screw, by an ordinary and simple process. It is hammered out again into ribbon. This ribbon is wound round a mandril into a spiral. This spiral is welded into a tube, which, eventually, forms the barrel of the gun. On the barrel being finished by the workman, acid applied to its surface operates on the softer parts of the iron out of which the barrel is formed, and reveals the consequent effects of the repeated weldings and twistings alluded to. Hence the reporter's application of "twist."—Ed. *B.A.R.*

With regard to construction, the Frenchman still affects, as he did in 1867, the back-action lock, and the breech-lever working under the barrel, in the place of the fore-end. There are few of bar pattern, even among the best; and of the commoner sorts, there are none. I do not like the colour they put upon their iron work, it is a nasty, dead, uniform gray; not clouded, as our case-hardened work is. Neither could I feel altogether pleased with the shapes; the best guns even did not seem to have that beauty of contour which our English eyes are accustomed to. As to soundness and quality of work, I could form but little opinion. In one or two of the guns most expensively got up, I noticed a slight gaping of the breech joint at face, which would here be considered a fatal defect; beyond this, I saw no fault to call for notice. Pondevaux, a first-class medallist of 1862, has a small useful collection of sporting guns, as good to look at as any here.

The prices marked upon some are not such as to frighten us; we could produce the same quality for less money. Middle quality breech-loaders range from 300 to 450 francs—i.e., from £12 to £18.

The only case I obtained access to was that of Galard, of Paris. I should take him to be a good practical gun-maker, who knew the points of a gun well, and had an enterprising and inventive mind. He does not disdain the allurements of art: for he has a few very respectable *armes de luxe*, but the bulk of his small collection is of a useful character. The attendant took a revolver to pieces, and put it together again, in my presence, without using a single tool, The stock comes away by pressing a spring underneath, and lifting it out of a break-off joint; the unturning of a thumb-screw releases the spring; the side comes away, having been partially retained in its position by the stock; and then the limbs lift out one by one, none of them being pinned in their places, but having axles, which work in pivot holes. The one spring serves as mainspring, trigger-spring, and lever-spring. It is as sound and strong as need be, and boasts to have fewer limbs than any other revolver in existence. There is also an ingenious arrangement for extracting all the cartridges together.

Crossing Italy, where there is nothing to detain us, unless we are irresistibly arrested by that wondrous galaxy of marble statues stretching across the nave, we come into the territory of our great rival.

BELGIUM.

This is an awkward division to examine, by reason that some of the guns are here, and some are yonder in the Rotunda. It is nothing like the display in the Paris Exhibition, either for quality, variety, or extent. Bayet Frères are the principal exhibitors, a name I remember in the compact and representative Belgian Departments there. I have little to add to what I then reported, viz., that, in all salient points, the Belgian work seems like a copy of the French. They aim at the same kind of artistic adornment, and in style, finish, and other respects, the only thing that distinguishes their work from the French is a certain indefinable air of inferiority, that somehow makes itself felt, though the scrutineer might be puzzled to tell why. It is not that this or that point is inferior in any marked degree; but there is a general drop, like that which would appear in the copy of a great picture, done by some inferior hand. Every line and tint of the original may be there, faithfully and mechanically copied, but the inspiration that gave it life and character is away. My impression is confirmed that the Belgians are great copyists, little more. They take up every new idea as it comes out, and sometimes plod away till they make a success out of it, but sometimes they are found wearily following a lead that everybody but themselves has abandoned long before. In one branch, however,—and this, again, is a thing I formerly remarked,—they seem quite up to the times, viz., in the manufacture of revolvers. Parts of these are shown, in various stages, from the machines, and so nicely have the cutters performed their work, that very little remains for the hand-filer to do. We can see how it is that they have cut us out so completely in this branch; at least, in that part of it which consists in producing a neat, handy implement, and a somewhat complicated piece of mechanism, at a low price. They have had the start: they have got their machinery into good working order, and on a sufficiently large scale, and they have passed through all the preliminary difficulties of getting labour into harmony with the new conditions. There is nothing in all this that we could not do if we tried; but two or three fortunes would be sunk before we could get into the market with them, and meanwhile they are covering all the demand, and there is no inducement to try. Thus it comes about that Belgium has all but a monopoly in making a certain class of cheap revolvers; a monopoly even encouraged by our gun-makers, who purchase them largely in the filed state, have them proved and finished in England, and sell them as English-made. For the general market they suit admirably well: they have a sharp, agreeable action, a neat appearance, and present a great variety of construction. The 12-shot or 20-shot revolver is a bit of a wonder in its way, and it would seem a greater wonder if the purchaser knew at what price it was originally turned out from the warehouses of Liége. National supremacies in particular walks of industry are often begun in this way. An individual manufacturer, with more ingenuity, courage, or foresight than the rest, begins a new trade. Others round him follow him up directly they perceive his successes. The thing grows, and before the world is aware, they have got such a hold upon the market that it is worth nobody's while to go against them.

These revolvers are too light for military use, but the Belgians are now turning their attention to producing strong, serviceable weapons, and no doubt will, in time, compete with us in all the markets. There is one exhibited which seems a sensible, solid article. The stock turns up on a hinge, and then the side-plate can be moved round on a pivot, leaving the works exposed. It is handy for oiling, &c. This revolver boasts to have fewer pieces than that of Galard.

In the Belgian Department are some guns and parts of guns made of phosphor-bronze, a rich-looking material, almost as much so as aluminium bronze. On looking at the case and seeing such things as chisels, scissors, and other cutting instruments, made of the same alloy, I wondered for a moment whether the long buried secret of the bronze ages had been brought to light again—the secret of tempering brass to bear an edge, which it is said the older nations possessed when iron and steel were unknown. I had no opportunity of finding out how far it had been found applicable to such purposes; but with regard to its use in fire-arms, I was afterwards led to understand that a few awkward explosions, occurring after the metal had been supposed to be fully proved and tested, had effectually exploded its pretensions.

The prices affixed to some of the guns seemed to me rather high. A breech-loading double gun, very plain indeed, was marked £6; a muzzle-loader of the same quality, £2 16s. I am afraid there is not much reliance to be placed in these Exhibition prices; they probably do not represent the manufacturer's wholesale prices, but the retail price of the shopkeeper, the manufacturers' wholesale customer, who would be offended if his profits were exposed. I know an instance of a manufacturer showing in an International Exhibition who was obliged to reprice all his goods at the dictum of a powerful customer, he having innocently ticketed them, in the first instance, at the price at which he sold to the said customer.

The military guns shown are of all conceivable systems, and if they represent faithfully the work actually done in the factories, their trade must be extensive and various indeed. I took down the names of more than fifty different breech-loaders in one case, muskets and carbines. It would be an utter waste of time for me to describe them. Most of them are well known here ; indeed, some of them seemed to me very suspiciously like English make. But if it were not strictly a case of manufacturers' patterns, but a collection of the best known arms, in the nature of a museum, the sending it there was a piece of enterprise which rather took the shine out of *us*.

THE GERMAN EMPIRE.

Some of the guns are in the Rotunda, and some in one of the large annexes outside, where I very nearly missed seeing them. Those in the Rotunda are sporting guns from Breslau, Berlin, Lubeck, Frankfort, &c., with some military arms from Sommerde. There is a good finish about the Prussian work, and also a considerable amount of taste shown in the production of some few *armes de luxe*, which are not copies of the French. Seschener and Co. show some sporting guns that would have puzzled our fathers, being without locks. It is a breech action, like the Martini, and the lever does all the business.

In the Annexe is a great gun-barrel trophy, and a quantity of guns, pistols, &c., made wholly of phosphor-bronze. If this material be not suitable for barrels, it might be used for some other parts which are not exposed to disintegration by repeated strain. It is really handsome in appearance, and must be easier to work than wrought iron.

There is a pistol by Carl Limmerman, of Gotha, which, for delicate ornamentation, is a perfect gem. The general remark I have to make about the Prussian work is that it is very good, and that, while it has the usual Continental style, it is not a slavish copy. Though it has plenty of features that would much please an English brother of the craft, it has few, I think, that would much instruct him.

Pausing on our way a little to view Krupp's monster guns, which are in an opposite pavilion, we enter the building again, and make our way for

AUSTRIA,

Which has far the greatest display in the Exhibition. Again we revel in the charms of art, for here are plenty of those bewilderingly magnificent things which seem to throw our sober productions into the shade. I will not indulge myself by describing them in detail, for to do them justice would stretch out this Report to an inordinate length; and I have a misgiving that many of my professional readers would think such a subject hardly "germane to the matter" of gun-making. I will content myself with mentioning two, which struck me as having something peculiar in their ornamentation. One was a gun, with ivory scrolls and figures, exquisitely carved, laid on to the stock, and held there by screws. In combination with the enrichment of the metal work, this had a novel and imposing effect. The other was a pistol, the iron inlaid with gold in threads as fine as filigree, all over it, in a chaste and beautiful design. It was of hardened colour, and the mystery to me was, how they had managed to heat it to hardening point without melting the gold.

In the general and extensive collection of sporting arms, there are many whose finish would take the conceit out of us, but very many more that would only excite our contempt. I never saw a greater contrast in work than between the good and the bad Austrian guns. Again and again I walked backwards and forwards from the French to the Austrian Department, unable to decide whether the Austrians were below the French in art, so nearly did they come up to that high standard. Long and fondly did I linger over the exquisite workmanship of some of the pieces, and wonder whether English hands could possibly excel it. And yet, turning, perhaps, to the nearest adjoining case, I saw the vilest examples of scamped and slovenly work it has ever been my ill fortune to look upon. One cheap gun was actually coming to pieces as it stood in the rack. If these are exhibited to show that they are equal to either extreme of quality, well and good. Otherwise, it is difficult to see what object their exhibitors could have in view.

Large as it is, there is not much to gather from this department. Some of the best work might give us a wrinkle, as, for instance, the get-up of their barrels, ribbed all round, or rather fluted, with chasing on the edges. It looks very rich, but, after all, the style is most suitable to those ornamental arms in which we take little delight. The general features of the Austrian work are heaviness and richness. All are more or less showy, and all are heavy and lumpy, especially about the butt.

Leopold Gasser has some useful-looking revolvers, made of wrought iron, and bored out of the solid. Parts are shown in the course of machining. One complete revolver appears as if sawn down the middle, in longitudinal section, to show the interior. The Austrian Government establishment sends a few illustrative specimens of the service arm, system Werndl, and also of the machinery employed in making them. A complete assortment of cutters are set out, with the parts of guns, swords, and bayonets, which have been shaped by their means. Gun-making by machinery is now an established fact, in every nation which professes to be at all military. This Exhibition has put that matter beyond doubt—hand-made military arms are things of the past.

After Austria "the back of the work is broken," as George Stephenson used to say.

RUSSIA.

We come upon a small collection of military rifles, systems Krink and Berdan. The Krink is something like the Snider, but the block requires to be thrown over quickly, and then it jerks out the cartridge case. Another fact the Exhibition brings out strongly—that breech-loading is the universal order of the day. Not a single national weapon is shown of the old muzzle-loading type. The science of destruction has kept pace with the other sciences, and the deadly breech-loader has become one of the emblems of civilisation.

SWEDEN

Has a very interesting military collection, hidden away in one of the annexes. Specimens are shown of the most ancient weapons, such as might have been used by the soldiers of Margaret, the Semiramis of the North and wearer of the triple crown of Scandinavia. Then we have, in regular series, the more modern arms, from those which armed the conquering troops of Charles XII. to the converted muzzle-loader, and finally to the bran-new service-arm of to-day, made by machinery, and of one of the many unimprovable systems in vogue. Both guns and machinery are quite up to modern mark.

TURKEY AND THE EAST

Send guns and pistols of ancient date, loaded with barbaric pearl and gold, which carry us back to the regions of romance, but do not give us any useful business information.

> "The pistols which his girdle bore,
> Were those that once a pacha wore;
> Which still, though gemmed and bossed with gold,
> Even robbers tremble to behold."

Such pistols might have done very well for Hassan, in his chase after the Giaour, but they would cut a sorry figure in action against those marvellous "repeaters" that the Western Exhibitors have shown us. These yataghans, scimitars, and long ivory-mounted fusils remind us that we have passed from the new world to the old: from progress to stagnation; from the restless activity and bustling rivalry of the West, to the dreamy, fatalistic, gorgeous immobility of the East.

CONCLUSION.

This brings us to the end of the building, and my task. It may, however, be necessary to sum up with a few general remarks. I regret much that my opportunities of observing were limited to outside show, and I fear that this Report will be of little value to technical readers on that account. So far as the review extended, it led me to two conclusions. First, that there has been no new development to speak of since 1867; and second, that the relative position of the different nations shows little, if any, change. The industry had then entered upon a new phase: it was accommodating itself to two new conditions, that of loading at the breech, and that of machine manufacture. Both these have grown, and grown rapidly; as I have already remarked, their adoption is almost universal. The period has been distinguished by a plentiful crop of patents for systems of breech action, and so far invention has been active, and a healthy stimulus kept up; but the trade has passed through no organic change, like that which culminated about the year of the Paris Exhibition.

I must confess to being vexed at seeing my own country so scantily represented. But for the contribution of Messrs. Webley, we should have been almost snuffed out. Whatever reasons operate to prevent manufacturers exhibiting—and it is not my business to go into them—the effect is to convey a thoroughly false impression to a casual observer. Judging from what he saw, he would probably arrange the gun-making nations in a series, with Austria at the top, and England nearly at the bottom. Perhaps the mistaken notions of any number of casual observers are of little consequence; but if these Exhibitions have any useful purpose, it must be in presenting a faithful picture of the industries of the world; so that the nations may mutually instruct each other, and that all may know what progress has been made in the arts of life. The burden of carrying out this object should not, I think, be left to individuals, but should rest a little on the public shoulders. The ideal way of carrying it out would seem to be, that the Governments of the nations should enter into a kind of partnership for the purpose ; arrange with each other where, and at what time, the International gathering should take place ; guarantee each other against loss ; and then, each for itself, lend the utmost encouragement to its people to exhibit and visit there. If half the glowing things that are always said about these Exhibitions be true, one could scarcely conceive a better use of the public money than in promoting them. Anyhow, it would be a graceful act, both to the exhibiting nation, and to its own subjects, if each Government were to help intending exhibitors, and relieve them of part of the enormous trouble and cost.

I see no reason to reverse the conclusion I came to at Paris, that there is nothing in the displays of the competing nations to give us cause for alarm. In such progress as has been made, we all seem to have been keeping pace together. The remark I made then I now repeat, that they beat us in their speciality, and we beat them in ours. The bugbear of foreign competition has long ceased to have any terrors for me. Healthy competition I hope we shall always have ; but that whose black shadow has been held over us ever since I can remember, and which was always coming to swallow us up utterly, I do not believe in. Each Exhibition I see convinces me afresh, that though England has worthy competitors, she is quite able to hold her own.

Labour Saving Machines.

By HENRY FOWLER, *Associated Reporter, Practical Superintendent of Machinery* (*Messrs. W. Blews and Son, Birmingham*).

TO furnish a detailed Report upon Labour Saving Machines in the Vienna Exhibition would take more weeks than I had days at my disposal (neither do I consider an explicit description of all machines necessary, even though they are specially adapted to Birmingham manufacturers ; I shall, therefore, confine myself to noticing the progress made, either in England or elsewhere, since my visit to the Paris Exhibition.

On entering the Machinery Hall at the Vienna Exhibition, I found myself in the department occupied by the United States of America. I was surprised to find so small a space allotted to a country which produces, if not the best machines in the world, certainly stands second to none, and, it must be admitted, turns out machinery of faultless workmanship, of modern design, and tools of the newest and best description—a fact which is proved by the number of Continental manufacturers making tools exactly the same as their (American) patterns, as well as some of our own, a few of which I shall presently refer to.

America.

Messrs. Sharp and Brown, and also the Pratt and Whitney Company, both exhibit their excellent universal milling machines for making cutters and spiral drills of every description ; also their screw-making machines, to both of which I referred in my Report of the Paris Exhibition. Both these firms send a few machines for gun-work, which consists of milling, drilling, and profiling machines: the workmanship and proportions of the whole invite the scrutiny of the most biassed competitor.

Messrs. Sellers and Co. show a very superior wheel-cutting machine for spur or worm-gearing. The frame that carries the spindle in the cutter, either vertical or spur, or at any angle, for worm wheels travels in a horizontal direction, with a quick running back motion, when the work moves by a self-acting arrangement for another tooth to be cut. By the use of change wheels, any pitch may be got ; the shape of the tooth is not turned to a template on the cutter in the ordinary way, but is cut on a machine (not exhibited), which ensures the correct shape at the back as well as the front of the tooth, as it cuts the clearance. As the tooth of the cutter is ground on the front by an emery lap, the true shape of the cutter is always preserved.

Baxter D. Whitney exhibits a complete set of machines for making ordinary house-buckets, a detailed description of which would occupy too much space. I may, however, just mention, that the staves are cut to the required taper, then hollowed out for the inside, then ploughed on one edge and tongued on the other, put together, turned inside, grooved for the bottom, turned outside, and the bottom cut out and levelled on the edge, entirely by machinery.

ENGLAND.

The next Department is Great Britain. Here are wood-cutting machines for builders, joiners, and cabinet-makers' work. England is still in the front rank, but how long it may remain so is difficult to calculate. Although its superiority to all other countries in design and mechanical arrangements is obvious, its strides have not been so great as either Belgium, United Germany, or Austria. This may be accounted for, perhaps, in two ways; the first, and most likely, is, the nearer a thing approaches perfection the less striking is any improvement; secondly, United Germany now numbers among its own, many manufacturers who at the time of the Paris Exhibition were French exhibitors. It would be difficult to say which of the following in this class of machinery makes the best display, as the workmanship and design are equally meritorious. One firm points out an improvement in one, and another in another place. Worsam and Co., of Chelsea, show a new machine for making the diamond and triangular pieces for parquetry flooring, &c., cutting them with the greatest precision, grooving and tonguing them at the same time.

Robinson and Sons, of Rochdale, exhibit a moulding machine for cutting circles or irregular shapes, specially adapted for cabinet-makers. The spindle in this case is placed vertical on a moveable frame on the top of the bench, and carries a double-edged cutter; the motion of the spindle can be easily reversed by the operator to suit the grain of the wood. This firm also show a dovetailing machine, in principle the same as one shown by an American firm at Paris, but with several improvements, among which is, the pitch of the dovetail can be altered by the same leading screw.

Powis, James, and Co., of Lambeth, London, send a wood-planing machine, the front of which is hung on hinges, so that it swings back out of the way when it is necessary to get at the cutter block. Underneath, attached to this machine, is an exhausting fan, which receives the chips and blows them through pipes into the stoke-hole of the boiler. This firm also contribute a band saw to cut at almost any angle while the table remains horizontal. The principle of this machine appears to be copied from one shown by Dupriez, of Paris, at the Exhibition of 1867, but has considerable improvements, and is much better made.

Ransome and Co., of Chelsea, London, show an excellent double tenoning machine, which can be so adjusted as to cut tenons any distance apart and any length or thickness, the shoulders equal or unequal as required. This firm also show a morticing machine, the novelty of which consists in its being able to reverse the tool without stopping the machine. This is done by means of a small gut pulley placed on the top of the upper bearingt; he spindle carrying the chisel moves freely through the pulley in a vertical direction; a gut band, or rope, passes round this over two guide pulleys to the shaft underneath; two stops are placed in this upper pulley in opposite positions, preventing it from turning round, the gut, or rope, being slack enough to slip until the workman releases the stop, when it instantly moves half-way round. This machine travels more than double the ordinary speed of morticing machines, in consequence of not having to stop to reverse the tool, which greatly assists the chisel in clearing out the core. All these firms exhibit band and other sawing machines, also machines for planing, moulding, morticing, tenoning, and general joinery, the workmanship and design of which exceed all others shown.

G. L. Scott, Manchester, sends a machine for moulding large spur, mitre, bevel, mortice, crown, and worm wheels. It consists of a hollow iron spindle, working on a pin fired in the sand. This spindle supports an adjustable radial arm, at the end of which is an adjustable vertical spindle; fixed to the bottom end of this is a pattern of two or more teeth. This spindle is provided with a stop to regulate the depth the pattern can sink into the sand: the spindle is lowered to the stop; the sand is then rammed between the teeth; the spindle containing the pattern is then wound up by a worm and wheel motion (which prevents it running back). The centre spindle which carries the whole of the machine is surmounted by a spur wheel, to which is connected a dividing apparatus, with change wheels to regulate the pitch. This is turned round one or more divisions. The front spindle is then lowered to the stop, and the operation repeated. In the case of worm, bevel, or mortice wheels, a separate tool is used at the bottom of the front spindle to carry the pattern at any required angle.

A boiler rivet-making machine by C. de Bergue and Co., Manchester, commands special attention. This consists of a strong cast-iron disc about 2 ft. diameter, revolving at from four to five revolutions per minute. On the edge of the disc are inserted eight steel discs for holding the rivets. The hammer carrying the die for shaping the head is worked by a strong crank. At each eighth of a revolution of the disc, the hammer comes down once, exactly corresponding with the position of the die in the disc ; but a peculiar motion is given to this hammer by a cam which causes it to follow for a moment the rotary motion of the disc. An eccentric inside the disc forms the resistance for the hammer, and also pushes the rivet out when it arrives at the bottom. A pair of shears, worked at double the speed of the hammer, is attached to cut off the "blanks," which gives time for changing the bars, and, thus a sufficient supply of blanks is always kept up. This machine makes thirty-five rivets per minute.

Sharp, Stewart, and Co., of Manchester, exhibit a novel machine for shaping the inside of the rim of railway wheels. It consists of a tool fixed on one end of a rocking lever, the other end connected to a stud in the driving wheel. This gives a curved motion to the tool equal to the length of the arm. The wheel is placed on a horizontal table which has a worm and wheel motion for the feed. The machine is very compact and well-finished.

Passing over the departments allotted to France, Switzerland, and Italy, where I saw nothing worthy of special notice, brought me to the Belgium Department. I found there several steam engines of excellent workmanship and design, with many improvements ; but as it is not my province to report on this class of machinery, I shall confine myself to the remarks I have made.

EXHIBITORS IN BELGIUM, SWEDEN, AND UNITED GERMANY.

The firm of Bead and Co. of Verviers, exhibit a duplex lathe of excellent workmanship, but an exact copy of Messrs. Whitworths' of Manchester.

The firm of Munktell, of Eskilstuna, Sweden, exhibit a three-spindle drilling machine, and overhead motion, with friction driving pulley, exactly like those made by Sharp and Brown, of America.

Gschwindt and Co., of Baden, exhibit wood-cutting machinery in general, among which are planing machines for hard wood; these have rollers carrying knives in a diagonal direction on the top of the work. I had not an opportunity of seeing the machine in operation, but the work that was left in the machine was well done. This machine had an adjustable feed motion, which consisted of a disc, driving a roller from its surface; a screw on the end of the spindle carrying the roller renders it capable of being pushed nearer to or further from the centre of the disc; this of course alters the speed of the roller, although the disc travels at a uniform speed. The whole of these machines were strong and well made.

A very excellent machine was shown by A. Esterer, Altotting, Baiern, for planing twisted flutes in stone columns, &c. This was similar to an iron planing machine in its construction. The work is held in chucks at each end, supported on metal bearings; attached to one end is a toothed wheel which gears into a rack, working transversely with the table of the machine; one end of the rack is made to slide longitudinally along a bar placed horizontal at the side of the machine; this bar has a joint at one end, and the other end can be adjusted to any angle with the bed of the machine. As the work travels backwards and forwards past the tool, the rack slides up and down the bar, which gives it a transverse reciprocating motion, which, conveyed to the wheel attached to the chuck, also gives a similar motion to the work. This arrangement is precisely the same as a gun-rifling machine, and only produces the twist on the work; but in case of columns where the line or surface is not straight, another motion is required to keep the flutes an equal depth; this is accomplished by means of a flat iron bar fixed edgeways and parallel with the work; the edge of this bar is made the same profile as the work: a roller fixed to the vertical slide of the tool-holder works on the edge of this bar, which causes the tool to rise and fall according to the shape of the work, the roller being kept down by a weight on a lever at the back of the tool-holder.

Ludw, Loewe, and Co. exhibit a screw-cutting lathe, universal milling machine, screw making-machines, and friction driving pulleys, all of excellent workmanship, but exactly the same design as Sharp and Brown of America.

Ateliers Ducomman, Mulhausen, Alsace, also show similar machines.

Wagner and Co., of Dortmund, send a very good machine for drilling three elongated holes at the same time through railway metals for the bolts of the chair. The frame carrying the three horizontal spindles is made to travel backwards and forwards by means of a connecting rod on a stud fixed to a disc, with a slot to adjust the stroke, while the spindles are pushed forward by the feed motion. They also exhibit a machine for squaring the ends off, and a very powerful machine for bending and setting rails; also an excellent combined screwing, tapping, and facing machine, and other machinery for similar purposes; all well made.

Many other firms in Germany, Austria, and Belgium contribute all kinds of machines of the Manchester patterns, and of equal workmanship, such as radial and other drilling machines, boring, slotting, shaping, planing, and heavy wheel-cutting machines.

Steam hammers were shown by English, German, Austrian, and Belgian manufacturers. The only new feature I noticed in this class of tools is, that most of the makers now make much smaller steam hammers, suitable for ordinary smiths' shops, than have been shown in previous Exhibitions. Davis J. Primrose, of Leith, and the Kirkstall Forge Company exhibit some very simple hammers of this description.

Sewing machines were shown in such abundance by almost all countries, that to make a fair report of them would occupy the whole time and attention of a special reporter.

Conclusion.

I will conclude with a few remarks on the Viennese workmen. I visited an engineer's and machinist's workshop connected with the Austrian Commission. My attention was drawn to the peculiar stiffness or want of mobility which characterises all Continental workmen in all branches of my trade. The smith at the anvil, the fitter at the vice, lack the elasticity and spring of the English mechanic.

Railway Carriage and Wagon Building.

By FREDERICK C. COWNEY, *Birmingham.*

IN commencing to give a detailed Report of the Railway Carriage and Wagon Department at the International Exhibition at Vienna, I must, in the first place, solicit your kind indulgence, inasmuch as it is my first attempt at anything of the kind. The subject is of vast importance to the commercial world, and requires somewhat careful handling. It is patent to all that, as civilisation advances—and it advances with rapid strides—the power of steam will assuredly follow in its wake, if, indeed, it is not concomitant with civilisation itself. The birthplace of steam-power is England, where it has developed rapidly in almost every branch of industry. The railway interest is spreading over the face of the earth, and like its sister, the electric telegraph, the time is evidently coming when there will be a perfect network of the railway system. England, at one time, it is well known, was the only workshop for railway rolling stock, but now other countries have joined in the race more, especially America and the Continent of Europe; and it behoves this country to watch keenly that which is passing around her, in order to hold her own.

I will now give my "impression" of the railway rolling stock between Antwerp and the city of Vienna. We left the former city on the third of July, by rail. The carriages, which are strongly constructed, are sombre and heavy-looking in appearance. The third class carriages inside are painted to imitate oak, the partitions framed and panelled; are not so comfortable to travel in as those in this country. The seats are made a convenient shape; the backs are made hollow, which is tiring to the system for very long journeys. The "hoop sticks," or roof supports, are of iron, something after the following diagram ⊓, and placed very close together, in some cases as many as six in a compartment. The roof-boards are very narrow, and screwed from the inside. The doors are lapplated from top to bottom. The standing pillars have a strip of leather nailed down the inside, in order to keep out all the draught, which is indispensable for comfort in railway travelling. The doors are secured with locks, the handles of this shape ┌─, and Spanish latches; the commode handles run along the elbow rails and down the standing pillars, within nine inches of the bottom. The guard of the train walks along the step boards, holding by the commode handles, and examines the tickets while the train is in motion, a system worthy of adoption in this country in many respects, more especially as there are times when the guard's services are required before the train can be brought to a standstill, as in case of robbery or violence. The first and second class carriages are far superior to those in this country for comfort. The fastest trains very seldom exceed thirty miles an hour, in consequence of the numerous curves and inclines, some of which are very sudden, the engine of the trains, in some instances, having to be assisted up by means of a wire rope, which is worked by a stationary engine. The railways, however, have a very neat appearance; the metals are laid upon oak sleepers, and secured by means of a "dog-head" bolt, there being no "chairs," as is the system in this country. There are lavatories to most trains, which is very convenient in travelling long journeys.

On arriving at the Exhibition, I proceeded to the Machine Hall, which is half a mile in length, where most of the railway carriages and wagons are exhibited. There is not a single railway carriage or wagon exhibited in the British Department that I could find, while Austria and most other Continental countries are well represented. I walked round all the carriages and wagons I could find, and to my surprise I found them all locked. I had several keys with me, but they were useless, as their locks are very different to ours, so I contented myself with examining the outside. They are all very heavy-looking-coaches, and mostly panelled with iron, and generally painted of a very dark colour. The composite carriage, in most cases, supposing it to contain one first and two second class compartments, the first class in the middle, is painted yellow, and the second class green. There is no heraldry, nor a single garter of any description whatever on these, and in some cases not a fine line to be seen. The countries which exhibit are Austria, Prussia, America, and Russia.

AUSTRIA.

Prag Fern Ringhoffer, carriage and wagon builder, exhibits a sleeping saloon. This coach is 23 ft. long, 8 ft. 8 in. wide, at the elbow rails turning under about 3 in., gradually diminishing from the elbow rail. The framework is made of oak, and covered with sheet-iron panels, the panels having a very level surface. The doors are lapplated from top to bottom with very heavy lapplate, measuring 1 in. The hinges are very strong and well made, measuring 3 in. by 4 in., the bottom one larger in proportion to the turn-under of the body. The doors are prevented from opening too far to damage the body by a round-headed iron pin, which shuts against another with an india-rubber head. These pins are placed very close together, causing a great leverage on the hinges, which in time will cause them to work loose. The doors are secured by locks and Spanish latches; the latches are placed very close to the bottom of the door, so that it is impossible for the passengers to open them inside without the assistance of the guard. The commode handles are made of brass, running along the elbow rails and 18 in. down the standing pillar, so that the guard can hold by them and walk along the side of the train, to examine the tickets while the train is in motion. There is a zinc gutter fixed to the cornice of the body, to receive the water, carried off by means of a spout which runs down the end of the body. The body overhangs the carriage sides 6 in., the ends $1\frac{1}{4}$ in., and stands 1 in. above the carriage, supported by four iron brackets, which are riveted to the side of the carriage. The sides of the carriage are made of iron, this shape **I**, measuring 9 in. by 3 in.; thickness of iron, $\frac{5}{8}$ in. The head stocks and bars are made of oak: head stocks, 9 in. by 4 in.; middle bars, 9 in. by 4 in.; longitudinals, 9 in. by 3 in.; diagonals, 9 in. by 3 in. There is a kind of an elliptic spring in the centre of the carriage, to which each draw bar is attached; also six stepboard irons each side, three of which carry treads as well as the stepboards; the stepboards are carried past the end of the carriage 1 ft. 2 in., and are 11 in. by 2 in. The treads are made of sheet-iron well jagged; the head stocks have cast-iron end caps of a neat pattern. The guards are riveted to the bottom edge of the carriage side; the scroll irons are put on in the same way; the bearing springs contain eight plates, 3 in. by $\frac{1}{2}$ in. The draw-bar hooks and couplings are cleanly forged, and the couplings are well screwed. The side chains contain five links, the one nearest the hook being a round one, the other being the usual shape. The buffer castings stand out 1 ft. 2 in. from the head stock; the buffer rods measuring $2\frac{5}{8}$ in. in diameter; the springs for the buffers are in the castings.

The inside of the carriage is fitted up with great taste, and of very good materials. There is a passage through the centre of the carriage from one end to the other. The roof does not show any "hoop sticks;" it is covered with drab cloth, and moulded round the sides and ends by a 9-in. moulding of walnut. It is divided into panels by 1-in. mouldings. The sides and ends are padded and closely studded within 8 in. of the roof. The seats face each other, and are supported by turned legs. There are two cushions to each seat, the under ones being framed, so that they will draw out and meet each other to form a mattress; the cushions may be drawn together. The backs, which are divided in the centre and hinged, are let down to form a pillow, and when complete make a very comfortable bed. The elbows are of an oval shape and hinged, and are padded top and bottom. There are anti-macassars to prevent the trimming being soiled by the head; as they get dirty, they are changed for fresh ones, which gives to the carriage a fresh and pretty appearance. It is provided with nets and rods; the rods are made of iron, and are gilt. There is a silver-plated match-box with matches provided for each person. The glass frames in the doors are made to lift up and down. There are some pieces of walnut framing round the lights, which are worked with springs, and as the light is lifted up it will hold it in any desired position, which prevents all jarring, keeps out all draught, and gives to the door a finished appearance. The doors are provided with blue silk blinds, which are worked by means of a spring roller. The carriage is supplied with hot and cold water, which the passengers turn on at their pleasure. There is a van attached to the train with apparatus for heating the water while on the journey: the water is conveyed by means of pipes to each coach. It is also supplied with a lavatory. The walnut used in the interior is most beautifully figured, the trimmings are very tasty, and the workmanship good throughout. There is also a covered goods wagon, with sliding doors which run on rollers, exhibited by Austria. The framework is of oak, the "sheeting" of pitch pine. Both the wood and iron-work are most beautifully got up. The whole of the iron-work and springs are polished, and shine like silver; it looks very well indeed, but would not do for general use, as the iron would soon get very rusty. It in other respects contains no special feature. A coal wagon got up in a like manner is also exhibited.

Russia

Exhibits a sleeping saloon, a third class carriage, and one wagon. The saloon is a large and heavy looking carriage, with a platform at each end, and two doors. The body has a passage through the centre. The framework is made of oak, covered with iron panels, and has a turn-under of about 3 in., which overhangs the carriage sides 1 ft. 6 in. The body is supported by seven iron brackets riveted to the carriage sides. The carriage sides are made of iron. The head stocks, bars, tables, and longitudinals are made of oak. The wheels are made of iron; buffer rods with solid heads, the rod measuring $2\frac{5}{8}$ in. The body is painted lake colour, mouldings black, picked out with vermilion. The carriage or under-frame is painted black, with not a single line to relieve it.

The carriage is divided into three sections: sitting room, sleeping compartment, and lavatory—the lavatory in the centre. The coach is heated by means of a stove. The sitting room is fitted up with two chairs, couches, and seats, with a small table in the centre; couches and seats trimmed with scarlet plush edged with silver and scarlet lace of a pretty design; the table is covered with a blue cloth, and moulded round the edge. The trimming of the compartment is very tasty, and the material used of very good quality; the floor covered with a carpet to match the trimming; the roof covered with painted canvas of a neat pattern, divided into panels. The doors which divide the different compartments are veneered with walnut, and slide on rollers. The compartment also contains two cupboards and a mirror, and at night is lighted up by four lamps, each having two burners. The net rods are made of iron, and gilt. There are two glass frames to each door, one of which is balanced by weights. There is no ventilation whatever when the lights are up. The sleeping compartment is divided into four sections, with a passage through the centre. It contains sleeping accommodation for ten persons. The beds are placed one above the other; these are hinged and supported by straps. The upper beds are reached by means of a pair of small steps. The beds have no pillows for the head. There is a small shelf, supported by hinged brackets, for the use of the occupants. In other respects it is fitted up similar to the other compartment before mentioned. The third class and wagon have no special feature to recommend them.

Russia also exhibits another coach by a Prussian maker for Russia (I. C. Reifort and Co., Bockenheim). This carriage is 10 mètres long by 3 mètres wide, oak-framed, with iron panels. The body overhangs the carriage sides 1 ft. 6 in.; the body is supported by three springs each side, under-frame fixed to the carriage sides. The carriage is entirely made of iron, and carried by three pairs of wheels with bearing springs. The buffers have elliptic springs. The construction of the coach is called American and German. It differs from the other carriages in having a passage down the side, so that it shall not divide the carriage into two parts. It has a lavatory and stove at each end, with a small compartment for the guard. The lights may be covered up with a kind of padded shutter, to exclude all light and draught ; it will seat twenty pasengers and sleep ten ; it is fitted up with mahogany and scarlet plush, with blue silk curtains for the windows, and it is ventilated by an apparatus in the roof. The coach is painted green and suitably fine lined.

VIENNA.

Hernalser Wagon Works, Aktien and Co., Vienna, exhibit a specimen of a two-story third class carriage. Both stories are very low, it being impossible to stand upright. The idea is to economise labour, and to use up short timber which cannot be used for ordinary coaches. There are steps at the end of the coach to ascend to the second story ; they take away a great deal of the room gained by having another story. The inside is painted and grained to imitate oak ; the seats are down the sides, with a passage through the centre of each storey. The workmanship throughout is very rough. The carriage presents a very ugly appearance to the eye ; a very little is gained by the second story, and what is gained is to the discomfort of the passengers.

AMERICA

Exhibits an American tramway car, manufactured by J. Stephenson and Co. (under Young's patent), New York. This is a very compact-looking car, and does not differ very much from those that were built at the Metropolitan Railway Carriage Works for Dublin. The American car does not carry outside passengers, whereas those built for Dublin do. Length of the body, 16 ft.; of platform, 3 ft. 6 in.; width of body at light rail, 7 ft. 7½ in.; width at waste rail, 7 ft. 2½ in.; at bottom, 6 ft. 1 in. There is a platform at each end and a door, eight lights each side of the car, with neat landscapes painted above them edged with gilt mouldings. There are two movable lights at the end of car protected by three bars. The seats run down each side of the car, supported by four turned legs 1¼ in. in diameter, which are boarded and covered by movable cushions of green plush; the backs of the seats are trimmed with the same material. There is a caboose in the centre of the roof 7 ft. 9 in. long by 3 ft. 10 in. wide. The roof is supported by 18 hoop sticks made of ash and framed 9 in. apart, with two stronger to support the caboose. The roof contains a great amount of work occasioned by the caboose. The side lights and blinds—the blinds made of pine—lift up and down; when up are secured by springs, very awkward for the passengers to adjust, who must frequently get their fingers pinched. An iron rod runs along each side of the caboose to strengthen the roof; leather straps are attached to it for the accommodation of the passengers to hold by when getting in and out; and a mirror and paraffin lamp at each end of the body. The lamp is a patent one, by F. B. De Keravenen (patent assigned to J. H. Bailey and G. A. Jones). The lamp works by means of clockwork, working a small fan, which supplies air so that the lamp will burn without the aid of a glass chimney. The floor of the car is neatly carpeted. The strongest part of the framing is made of oak; the pole is made so that it will fit each end of the car. The brake handles, commode, and all the door furniture is silver plated. The wheels are Raddin's Elastic Car Wheels (Lynn, Massachusetts); the brake is worked by means of cross levers. The middle panels are painted yellow; the top and bottom panels white fine lined to match; in the centre panel there is a painting of Grace Darling. The workmanship is good throughout, with the exception of the painting, in which there is plenty of room for improvement.

MODEL HOSPITAL CAR.

Facsimile of the railway car employed during the late civil war in America used by the United States Sanitary Commission for the transportation of the sick and wounded. The model shows a system of heating and ventilation, and represents in its general construction an ordinary American passengers' railway carriage; scale 1 in. to the foot. Length of body, including platforms, 14 ft. 11 in.; width of body, 2 ft. $3\frac{1}{4}$ in.; the roof overhangs the body 6 in., the platform $7\frac{1}{2}$ in.; the sides of the coach are straight. There is a caboose running almost the whole length of the body, and twenty lights on each side, with venetian blinds. It contains thirty beds in tiers of two, one above the other, swung on india-rubber bands. There is a surgery, with a medical chest and every necessary for medical use, with boiler for hot and cold water, and washing apparatus. The body is carried on two "boggy" carriages at almost the extreme ends of the car. The space between the boggies is strengthened by iron girders. The wheels are made of iron. The body is painted brown picked out with gold. On each side appropriate subjects are painted, i.e., an Angel visiting the wounded on the battle-field; a Nurse administering medicine to a sick soldier; American Eagle; Charity. It is a very good model, every thing throughout being well arranged, with great care and taste, and must have proved a great blessing to the sick and wounded in that disastrous war.

WELCH'S RAILWAY CATTLE, SHEEP, AND HORSE-REFRESHMENT TRUCKS.

No. 1.—The model represents an ordinary cattle truck, and is equally adapted for the traffic in store or fat cattle. It is constructed with a variety of plans for the refreshment and stalling of cattle. In practical use one plan only would be adopted in each truck. The animals can be loaded in loose order, as is customary at present, which utilises the greatest available space in a truck, and animals avoid fatigue by changing their positions occasionally. The water troughs extend entirely around the truck, doors included, enabling each animal to drink in comfort. The sliding partition across the truck prevents the load of cattle from pressing to one point of the truck; it permits them to be sorted, separates them into two bodies, and prevents the risk of damage from crowding. The animals can be loaded or unloaded from either side of the truck. The valve to supply the water to the troughs is worked from either side, and by one operation fills all the troughs, as the pipes retain no water in them, it cannot freeze in them. Turning the wheel at the end of the axle on the top of the truck; lifts all the covers of the troughs simultaneously, and opens all the troughs for the cattle to drink from, and it closes them likewise (an important operation, because cattle should be refreshed only, and not be permitted to drink too freely while travelling). The covers effectually close the troughs from dust and soiling. One man, from either side of the railway, performs every operation necessary for loading or unloading, or refreshing the animals. Ventilation is good throughout these trucks.

Nos. 2 and 3 trucks are the handiest and most economical stalled trucks for horses. The peculiar form of the sliding stalls permits the animals to be loaded and unloaded from either side in the quickest time, and the animals are not required to be backed in unloading. These contrivances are much more simple and effectual, and less expensive, than those of the horse-box now in use on the railways. And a plant of these trucks, put into use for the ordinary horse traffic of this country, would be most advantageous for military purposes in shifting cavalry or artillery horses in the quickest manner, and refreshing them on their journey. None of the fittings and fastenings of these trucks are complicated; all are easy to move, and well suited to the rough work and the expedition required for the traffic in cattle.

Though not exactly within my province, though certainly connected with wagons, I now direct attention to the

ROUND BRAKE

System (Schouberszky), which stops a train in ten seconds, not only with the aid of engine-driver, brakesman, or any passenger, but also by a self-acting power in case of rupture or other injury to the train. The engine-driver, on whom depends the speed of the train, has the means of increasing the speed, but is unable to stop it quickly himself in case of necessity. He is forced to alarm the brakesman to apply the brake to stop the train. At present the method of working the brake by manual power is very defective, as it involves a great loss of time. While, on perceiving an obstacle on the line, the engine-driver is whistling to give the signal for applying the brake, and, perhaps, the guard is busy with his parcels, or shaking off his drowsiness from many hours' toil, going to the brake, and taking hold of the handle, and with their comparatively feeble strength pressing the block on the wheels, no small time may be lost. Supposing all these, taken collectively, occupy only a quarter of a minute, the train may already have run on a quarter of a mile before it comes to a complete stand. But obstacles on an occupied or damaged line—for instance, a train on the way, &c.—are frequently invisible at such distances, in consequence of curves, fogs, snowstorms, &c. These are of the greatest importance wherever trains are running frequently; in such cases, not only the accidental stopping of the train, but even the slackening of the speed by a train in front may cause a collision with all its dire consequences. All those accidents of such frequent occurrence might be prevented, if the engine-driver, as the first who should perceive the danger, could by a single movement of his hand stop the train, without the assistance of the brakesman.

What the round brake is.—This contrivance for quickly stopping the train presents a marked contrast, by its outward appearance, to the brake at present in use—the blocks of metal or wood pressed against the wheels in ordinary use being replaced by a disc, which simplifies the whole to such a degree that the management of the brake demands only a very slight exertion. The disc approaching the wheel is caught by it, and the motion of the train causes the pressure to be exerted on the disc, and immediately arrests the train. For the quick operation of such brakes (distributed along the train), a very watchful agent is required; such an agent is found in compressed air.

Air, so liberally diffused on the earth, possesses the property, if subjected to compression (in a reservoir) to a degree twice that in which it is in a free state, if permitted to escape through a pipe, in its desire to establish an equilibrium, will accomplish the task assigned to it with the astonishing rapidity of 1,000 feet in a second, corresponding to 750 miles in an hour. With the aid of so active an agent there is no loss of time in applying the brake. The air is conducted to each carriage by means of slender tubes, similar to those used for pneumatic bells. The pressure of air keeps by its arrangements the round brake a certain distance from the wheels, but as soon as the compressed air is applied, the operation of stopping the train is at once accomplished.

The compound action of the entire series of round brakes exert so powerful a friction, that the speed of the train rapidly lessens. The stopping is effected imperceptibly to the passenger, who feels no jolt or shock, because the resistance employed to arrest the train, acts gradually, and is not in the least accompanied by a jolt. The pipes are laid throughout and alongside the carriages. They are furnished with cocks placed, not only on the locomotive, but on each carriage, within the reach of the brakesman and passengers. By this brake anyone who observes the possibility of a collision is able to stop the train, simply opening the cock, to let free the compressed air. This facility of quickly stopping the train will, there is no doubt, prevent many accidents, the anticipation of which at present causes so much alarm to all railway passengers. They will have a far greater sense of security when they know the destructive speed of the train can be so easily and quickly stopped by a brake so effectual as the "round brake" system of Schouberszky. It possesses every quality for ensuring safety, which has been proved by repeated trials in Russia. Experiments were made outside the Machine Hall of the Exhibition, gave general satisfaction, and appeared to prove its efficiency.

AMBULANCES.

Baron Munday exhibits a very excellent collection of ambulances, kitchen wagons, goods carriages, and eight railway wagons for use in the time of war, including stretchers of every description, which can be arranged into every conceivable shape for the carrying of the wounded; also, several complete sets of surgical instruments, blankets, bandages, medicines, &c. The ambulances, kitchen wagons, carriages, &c., built according to the instructions of "the Baron," by Lohner, Vienna; Lovati, Turin; Killner, Paris; and Adams, Westminster, London. I was introduced to Baron Munday by the English Commissioner, Philip Cunliffe Owen, Esq., as the artisan reporter on railway carriage and wagon building for England. The Baron gave me an invitation to meet him next day to examine his collection, which I accepted. He showed me through the carriages, &c., himself, and explained everything connected with them. He informed me he had been several years in getting up the collection, entirely at his own expense, and he must have expended several thousands of pounds. In the time of war they were always ready, free of expense, for the service of his own or other countries.

In concluding this Report, I have given a general idea of some of the most salient features of the most important carriages and wagons, &c., within the walls of the Exhibition building, but unfortunately there were several which I had no opportunity of examining, as they were locked; being unacquainted with the language, and without an interpreter, I was unable to explain my desire to examine many. The carriages on the whole were very heavy looking, and possessed no claims whatever to gracefulness of shape in outline; they were, as a rule, painted all one colour, and without even the crest of the company to which they belonged. The insides of the first and second classes and the sleeping saloons are certainly very much superior to our own for comfort and general arrangements. I consider we have very little to fear from Continental competitors in the art of railway carriage building, though I would we had in Birmingham better means for instruction by professional draughtsmen. I am happy to say I have gained a little knowledge through visiting the city of Vienna. The city, to my mind, is a magnificent one. The sanitary arrangements, however, are not what they should be, and the water for domestic purposes is very inferior.

The mode of living is somewhat peculiar, to our Western ideas. Parents have their favourite "cafés," to which they repair with their families to dine. I am proud to say I saw not a single case of drunkenness, notwithstanding a great quantity of wine and beer is consumed. The inhabitants, as a rule, are early risers, and do most of their marketing before breakfast. Some curious sights met us at every turn, as little milk carts going their rounds, drawn by dogs, and sometimes a girl and a dog. This latter exhibition I did not admire at all. There was something revolting in the spectacle—a spectacle that would not be tolerated in England. The streets of the city are pretty well watered during the day. The water is contained in large barrels on wheels, drawn by a horse. A hose, which is about five feet long, is fixed to the end of the barrel, there being attached to the hose a "rose" similar to that of a watering-can; the man in attendance moves it by means of a rope from side to side as the water escapes. The women here seem to do all the hardest work, for we noticed them, sans shoes and stockings, and with awfully short petticoats, pumping water into the barrels, whilst the men sat smoking hard-by. I took the place of one of the women at the pumps; but after pumping about three minutes, I was glad to be released. Tramways are much in vogue in Vienna, though they seem to have no regulations as to the passengers they carry. The cars differ from those of this country; the sides are open, the roof supported by four corner pillars and two intermediate ones; the seats are crosswise, with a passage down the centre. The inhabitants, who appear to be a handsome race of people, are evidently fond of out-door amusements, and the female portion of the population far from being domesticated, forming a great contrast to the young women of this country. Considering my short stay in Vienna, it cannot of course be expected that I can speak of the education of the Austrians. I will only add as regards myself, if I were not an Englishman, I should like to be an Austrian.

General Ironmongery.

By GEORGE WAKEMAN, *Ironmongers' "Buyer"*
(*Messrs. Donald, McKenzie, and Co.*), *Birmingham.*

I HAD the honour of being selected by the Birmingham Chamber of Commerce (co-operating with the Society for the Promotion of Scientific Industry, Manchester) to proceed to Vienna in the capacity of reporter, the subject of my Report to be "General Ironmongery."

The term "General Ironmongery" is a very comprehensive one, according to the present extent of the ironmongery trade, including a great proportion of all manufacturing industries, but more particularly those in which metal forms the principal element. The names of, and the number of articles included, are legion, and, in the limited space necessarily occupied by this Report, it would be almost impossible to enumerate, much less report upon, *all* these articles. I propose, therefore, to deal only with those that came more directly under my notice during the hurried work of inspecting a vast collection of products in so little time; even those reported upon (at least a large number of them) will, it is to be feared, receive but brief notice. It may, however, be of advantage to allude to some articles allied to those industries connected with my mission which, though of importance, it was impossible to provide special reporters for.

General ironmongery, as a distinct class, was not well represented by any Continental competitors. Of course I speak comparatively; for there was no exhibit so general in the assortment of useful articles, either for furnishing or builders' purposes, which at all equalled that of our townsmen, Messrs. Collings and Wallis; though it would be open to objection, in an Austrian sense, that the articles there shown were for purely English requirements, and could therefore only be adjudged superior from an English standpoint. It is true there was little lack either on the part of Austria, Prussia, France, and even Russia and Italy, so far as multifariousness goes in articles, no doubt more or less used for all purposes; but in what *we* esteem to be builders' ironmongery and furnishing ironmongery, and what remains under the specific head of "general" ironmongery, the foreign exhibits were in no sense individually complete. Perhaps the apparent deficiency of particular articles was only a fancy on my part, heightened by the ever-recurring change and freshness of patterns which meet us in our daily experiences of factoring. Hence we may safely assume Continental requirements are not so great or varied in their charactar as those of this country. We will, however, give every credit to foreign exhibitors for any shade of excellence their manufactures possess, also being strictly impartial.

BUILDERS' IRONMONGERY.

We will, firstly, notice a few of those articles which come under this designation. In *cut nails*, as well as in every other kind, Prussia and Belgium were large exhibitors, although not *special*, who included in their exhibits all they could get. The cut nails were of very fine sample, cut in all cases from superior "sheet," and fully a gauge, and sometimes two gauges even, lighter than are our "fine clasp." They were remarkably straight cut, by which I mean *not skewed*, and were calculated for perfectly straight driving—what, in this sense, our joiners would call a desideratum. Well pointed and headed, they had no bulge under the head, but were of one exact thickness of material from point to head; and whatever pretence to a shoulder there was about them, was in the cut shape of the nail, being perhaps slightly wider near the head. They were excellent nails for general joinery, and *light*, giving a preponderance in count very largely over ours in consequence. The larger nails, from 3½ in. and upwards, were too light, and could not be used for the same heavy purposes as our cut spikes, but in other respects of the same clean, good, and apparently tough quality. The wrought, or hammered nails, were, *par excellence*, the best I ever saw. They were generally very fine square-shanked nails, nicely and carefully tapered at the point. The heads were rather large, almost pyramidical in shape, but what we should, for want of a nearer term, still call "rose-head;" but they were very evenly centred, almost ensuring a straight drive by most unskilful strikers. It was obvious that these nails were made of the best iron, and would cost something considerable, there being also every evidence of really careful forging. Among all that I saw there was no appearance of wasters, or burnt, "scaly," or calcined ones, such as we are often obliged to see in those at home. This may, no doubt, be often obviated by a better price being paid for labour, and uniformly good iron being issued by the nail-masters; for I have no possible doubt in my mind that herein lies the root of all the complaints our customers at home and abroad have occasionally to make respecting inferior quality. A good hand-made well-hammered nail will always command a market, and maintain a good price, in preference, for many purposes, to any quality of cut nails, or even the various kinds of cheap "patent." *Pointes de Paris* nails were exceedingly plentiful, being a peculiarly special Continental article. There is a larger variety of these wire nails than we make here, countersunk, and even round-headed. These are the common nails of Continental countries, more used than even cut nails. We now use them very largely in our own country for box-making and for a number of other light purposes. It is not a little gratifying to observe that our wire-drawers and others are so ably competing with Prussia in this respect. Tacks and shoe-nails are mostly made of wire; some of the tacks, and even larger-sized nails, have very broad flat heads. Of course these necessitate a superior and soft quality of wire, and I have no doubt they also will soon be added to our other kinds of articles of this class.*

Wood screws were neither satisfactory in point of quality or price, and I should have thought were made from inferior wire. The threads were jagged and shallow, and the ends very indifferently pointed. Heads were large but well nicked. The samples I examined did not prepossess me in their favour at all; they would at best compare only with our cheaper and worst qualities. Nettlefold's screws are far in advance as regards excellence of any, either in iron or brass, that were exhibited by foreign makers of screws. I was fortunate enough to obtain a list of prices, but on examination I found that the gauges of the screws and the lengths were given in "millimètres." So far as I can ascertain, the German prices are net, but there is a small discount allowed for cash, say, 2 per cent.; whilst we all know how much discount our trade lists are subject to, irrespective of that usual for cash. The difference in net prices appears very great indeed, so much so as to create some suspicion that the German, as quoted, may not be correct. The round heads are charged the same as flat countersunk heads, which is somewhat in favour of the German list, both for brass and iron. The brass screws are of the same rough style and quality as the iron above named. Brass and iron wire hooks, to screw and drive, are also made similar to those manufactured by our leading firms, and similarly proportioned in prices with the screws; also rivets, with flat, snap, or pan heads, of good quality, from smallest size to about 1½ by ⅝ or ¾ in., about these I could procure no information as to prices.

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* I very much regret that price-lists and other desirable information were not obtainable, except in rare instances, nor were prices generally marked upon the articles. This condition of things will militate very much against the completeness of my Report, because there was, as a rule, an absence of printed information; and interpreters could not possibly be available for so many reporters without incurring very heavy additional expense to the Birmingham Chamber of Commerce, under whose auspices we were performing our work.

LOCKS.

There is a great peculiarity in Continental *locks* observable in almost every class. The peculiarity is that there is nothing English-like about them, either in appearance or internal construction. What we call *rim locks* are scarcely ever larger than 5 in. by 4½ in. for ordinary use. They (the Continental) are made of about 14-gauge iron, both *rims* and *plates*, the depth of rims generally about ⅞ in. or 1 in., which gives to the lock a heavy and substantial appearance. The latch-bolts are very thick, so are the locking-bolts, and fill up the depth between cap and back-plate. The latch-bolts invariably are made with a flange at the back, intended, no doubt, for a guide, so that when the bolt is drawn in it is thereby prevented moving out of the hold.* This is a good feature, and might very conveniently and with little expense be applied to some of our common-class locks. The "*followers*" in these locks are only single action, and spiral instead of rein'd, or "Scotch," &c., springs are the most common. *Wards* are the exception, not the rule, in Continental locks of almost every kind. Occasionally there is a plain *bridge*, sometimes a deep wheel without the bridge; but, on the whole, it might be supposed that no principle, nor any notion of a principle, as to safety ever was dreamt of even; and in respect to the common class of locks, as regards the security they afford, it is scarcely equal to that afforded by the egregious sham of our own, the "stub ward," being pretty nearly as worthless. But I would have the Continental locks in preference to our common ones by a very great deal. They are, as I before said, really substantial, everything being well fitted; good followers, strong, without any appearance of the excessive "pinching" of the metal, in every available way. The cases are all bright, and have an ornamental drop over the keyhole (which would not look amiss on ours); the staples are also well made, and match the width of the locks nicely. In fact, these locks would be GOOD, if they only possessed good wards instead of that interminable "fancy." Turn your head anywhere for a lock, and the *fancy key* predominates. The above described are not peculiar to any country, but are the usual make both for France, Germany, Austria, Italy, and even Russia. I cannot conceive that the price is very low, for although the cost of labour is really cheap in comparison with that of our own country, yet the time necessarily expended in their production must increase the cost very much ultimately.

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* It is of frequent occurrence in common rim locks or latches, if the latch head happens to be rather short, or the horns of the follower too long, that the bolt is drawn into the lock and becomes wedged behind the plate, there being no provision made for keeping the bolt always in position.

MORTICE LOCKS.

Mortice locks are not much used on the Continent. Those I saw of this class were chiefly confined to France and Russia; but my fancy inclined to the Russian, inasmuch as they nearly resembled our English manufacture. There were, however, very few, and chiefly made for light doors, never exceeding half an inch in thickness, and with the same absence of any safety principle by way of wards, but exhibiting the "fancy" and fancy-bitted key, as in all the others. I was somewhat astonished to find among the Russian locks a facsimile of Wilson's patent roller, or wheel-bolt lock. I call it a facsimile, but I do not know whether it may not prove to be an original. I desired just to pause a little at this lock, not because it may illustrate anything new in the art of lock-making, but because the principle of it might have some bearing on a controversy which has been going on for years among the initiated, respecting the originality and genuineness of Wilson's roller-bolt lock, so as to entitle it to patent rights. In the Russian lock the principle of the latch-bolt is precisely the same as in Wilson's;—namely, a solid roller is inserted in the head of the latch, and revolves upon a pin, which is riveted through the bolt. Its action is precisely similar to Wilson's. Now the idea that occurred to me was, that it is just possible for a lock to have reached this country from Russia or elsewhere, with a roller-bolt, years ago, the principle not being in general use, few caring to notice it. Wilson subsequently adopted, and perhaps, after sundry modifications, patented it. I know that old locksmiths declare to locks being made years before the date of Wilson's patent, with rollers in the latch-bolt heads. If the mention of this fact will tend to elucidate the difficulty, my purpose will have been well served. It may, however, be well just to call attention for a few moments to the principle or principles involved in roller-bolt locks. The roller purports to obviate the friction caused by the ordinary flat bevelled bolt when in contact with the striker, or at least to reduce the friction to a minimum. Moreover, it is maintained for the roller principle that there is greater ease and certainty in its action. While admitting that this may be so in a degree, and that the friction is only nominal, I am of opinion that all this pretty much depends upon, or at least is regulated by, the strength and elasticity of the spring. In this respect, also, may bevelled bolted locks be regulated, if only care be taken to shape the bevels so as to reduce the friction to the smallest degree. This may be done by slightly raising the bevel up its centre or striking-line, and so limiting the friction to that line, instead of distributing it all over the face of the perfectly flat bevels, which is so common in cheap locks. It will be obvious, then, that the extra expense of patented roller-bolt locks might be spared, if only a little care (without increasing the expense at all) were to be taken in the construction of the bevelled bolts. The extra advantages to be derived presumably by the use of roller-bolted locks is not commensurate with the extra expense which they entail on the consumer, and in this lies (I fear) the reason why they have not been more extensively used.

Cabinet Locks.

There were but few cabinet locks in the Exhibition; but we apply this term to locks of the rudest and commonest kinds, creating quite an anomaly in this respect, because we are accustomed to a general and proper idea that a cabinet is a respectable piece of furniture at least, but mostly understood to be of a high order of workmanship. However, there were locks here, which, for convenience, we will call "cabinet," because, some way or other, they are used on wood-work of certain kinds—it may be boxes, or drawers, or cupboard doors, of various degrees of respectability. We saw locks in brass and iron that might answer all the purposes just enumerated. Some locksmiths possess a notion already respecting the characters of their Continental locks, as it is not unfrequent for them to have to make others of superior quality, "to fit place of lock sent." These Viennese cabinet locks (and we name them Viennese, because they pretty fairly represent the whole) are made very shallow to avoid cutting away much wood when fixing, for the lightness of the wood in cabinet or any other similar work is characteristic. These locks are mostly made of iron upon the old "back-spring" principle. The "fancy" here again predominates; and to the innocents, who know little of "jemmies," "wedges," or "skeleton keys," they afford ample security, for "where ignorance is bliss, 'tis folly to be wise." I daresay the locks among the commonalty take best that possess the most "click." We sometimes come across people in our own land who prefer a lock with plenty of "click," and emphatically call it "a good 'un," paying a price equal to their fancy, rather than have a "Barrons" or good-levered lock, which works "noiselessly but sure!" But unless the work is neat, if we would only show as much care to have our locks as thin as possible, so as not to weaken the woodwork when fixed upon it, it would be quite worth the trouble of doing. These kinds of locks necessarily are cheap; the material is so light, and wages so low, that I fear it would be useless to attempt the introduction of our own cheap goods to supplant them on the soil of their growth.

PADLOCKS.

Padlocks were more numerous in the Austrian exhibits than in any other. They are nearly all made of iron, and circular in shape. The shackles are not hinged, but pull in and out of the case of the lock, much the same in this respect as some of our improved kinds. The key-hole is never, however, centrally fixed, and is generally skewed to suit the position of the inside works. Bushes there are none, but invariably plain iron bars or drops cover the key-hole. The quality was good (being mostly either six or eight-levered), which showed me that for some purposes at least the Austrians knew the value of good and safe locks, and could make them if needed. There was no variety in appearance; all had the same well-made cases, and all were brightly finished. Japanning or galvanising would appear to be altogether unknown, or, if known, at any rate not applied to any of the many practical purposes for which we have recourse to it. But the foregoing is by no means an adequate description of all the locks exhibited by Continental makers; indeed it is but a meagre representation of the medium and common kinds, and for every-day uses; were it otherwise, we could form but a sorry idea of this now important branch of industry. There is yet a style of lock-making of a very superior order, which, though it may be here represented in its most specific form, illustrates to the looker-on that facilities are not quite wanting, neither in good tools nor better hands, for turning out some really excellent work; excellent in all the important points of security, compactness, high-class workmanship, as well as really beautiful and artistic finish. I allude more particularly to safe door locks. These locks are very substantially made, being invariably faced with hardened steel, and also powder proof. In some of them is observable very great ingenuity as respects their construction. I saw a French lock fixed to a safe in which were four round holes underneath the proper key-hole, which were, as it were, sub-portions of the main lock. There seemed to be a changeableness about them, so that it would depend entirely upon the knowledge of the holder of the sub-keys whether the safe may or may not be opened. The sub-key, which answered for all four of the sub-portions of this lock, was very similar in shape to those of the "China detector," but did not contain any slots up the stem (which is quite solid, not being drilled), but slots or notches of a transverse character, and turned upon the solid stem, which are subsequently filed into various sized ovals to suit the arrangement of levers. I was informed that these sub-portions held or released the actions of the grand lock, according to the order of using them. This lock was a very good specimen of French work and ingenuity. As a whole, the French exhibits in this respect were highly creditable, and some of them exceptionably good.

Latches.

Latches are of the same make and style as the rim locks, with slide bolts underneath the bottom rim. But others have a cranked handle attached to end of the tail of the latch (which passes through the back rim), of an ornamental kind, by which to draw back the bolt. In most cases there is a locking bolt to these, to lock from the outside, which makes the *latch* really more expensive than the rim lock. Of course none of these would be suitable for general adoption, yet I should like to see the spiral spring occasionally applied, and some patterns otherwise conveniently assimilated to the Continental locks for purposes of trade in that country. I do not doubt but with some slight approach to, or modifications of, their own patterns, our neighbours might be disposed to give us some good orders, and particularly so, as I think, decidedly, our locks (unless the tariffs are *too* prohibitory) would sell cheaper than their own. In Vienna and other large towns of Austria and Germany there is a constant demand for locks and other kinds of builders' ironmongery.

Conclusions as regards Locks.

Of the two leading exhibiting nations, France and Austria—for competition runs high at the Vienna Exhibition—I am disposed to view the Austrian productions more favourably than the French, despite the fact that in the common class there was nothing to commend them. It was, however, a real surprise to me to find such extremes in this respect on the part of the Viennese; for while they showed their commonest as being those in daily demand, they took good care to show the best also, and this to no little advantage, because a contrast so great and unexpected would more readily excite the attention of the visitors. Among a number of excellent specimens of this manufacture was one even more novel in its construction than that already alluded to in the French Department. This also was a safe lock, the plate of which was circular, about 8 in. in diameter, made of hardened steel, and very richly engraved. The works were fixed on the back of this plate, similar in many ways to those of a timepiece, and were let in and securely attached to the inner door of the safe. In the plate of the lock were cut about eighteen apertures, ¾ in. long, and through these, projecting just slightly above the surface, were revolving rings or rollers, with milled edges on one side, exactly like those used in letter locks. Nine rings were *lettered*, and the remaining number were *figured*. These, when moved round with the thumb and finger, might be formed to spell a name, or give a number, which, to the initiated, would indicate that the lock was free to be acted upon by its proper key. The application of this "roller-lock" principle, complicated as it needs must be, rendered the picking of this lock as near as possible futile to attempt. My inability to describe more minutely all the arrangements of this ingeniously constructed lock (which very much resembled the wheels and cogs of a timepiece), as well as others of an equally interesting kind, I very much regret. Not having the advantage of an interpreter, on the one hand, and so few of the attendants at the various stalls speaking English, and some of, to me, the most important exhibits having no attendants or custodians at all, made the work of getting information very difficult.

The ornamentation in the above classes of lock manufacture is beyond praise, but it is pleasing to know that utility is not, after all, sacrificed to the mere appearance, although, as far as concerns the embellishments of safe locks, it is necessary that they harmonise with the character of the safes they are intended to secure, a short description of which I hope to find a little room for a page or so forward. All these locks are, however, specialities, and answer their purpose, if only to show Englishmen, "the first lock-makers of the world," what may be done in other countries, if occasion requires; and Austria, perhaps more than any other country, has, for this Exhibition, put forth all her strength, and taxed to the utmost all her ingenuity and skill, to show to the world that, coincident with great legislative reforms, the popularity of her institutions, and the largely increased care evinced by the Government for the social welfare of the people, together with the extension of national liberty—coincident with all these has been the expansion of the national mind, and the growth and development of her resources.

I have already called attention to the plain character of the door locks, and the absence, pretty nearly, of mortice locks, which arises probably from the fact that very few are used. If this latter be so, it is necessary, in public and all other buildings of a superior kind, to apply ornamental coverings to hide the plainness of the locks; consequently much attention has been given to this branch of trade, namely, to *lock cases.* There was marked cleverness both in the design and finish of these lock cases, as also in the plates, which renders them positively admirable to look at; and one could not but think, for the doors of our banks and public buildings, these, both in ornamentation and general adaptability, are decidedly preferable to the plainness otherwise observable, and due in great measure to the use of mortice locks, for which we English appear to have a decided weakness. Of course, work of this kind, produced as it is in France, and equalled in Vienna, almost regardless of expense, does not find its way, except to a very limited extent, into this country. This is perhaps rather surprising, because we find in England no lack of fastidiousness among our leading architects, as to the quality and character desirable in those articles they are wont to suggest, both useful and ornamental, to adorn and embellish their best buildings; nor, generally speaking, is niggardliness a prominent feature in wealthy English employers of architects. I would not disparage the efforts of some of our leading firms to produce a really artistic class of goods, and to vie, as far as possible, with our Continental competitors in this respect; but unless encouragement is held out to the workman, to induce him to undertake the study, and to implant within him a determination to master and excel in this advanced style, it will never be accomplished to any appreciable extent. I think, however, I am correct in stating one or more Birmingham firms do already supply ornamental brass foundery, including cabinet and door handles, centre knobs, espagnolette bolts, bell-pulls, &c., direct to Continental houses. This is gratifying to know; and let us sincerely hope we may in time be able to offer articles equal, in an artistic point of view, to our neighbours, and also have a good demand for similar high-class articles for use in England.

HINGES.

In respect to hinges there is very little to say, certainly nothing commendable in regard to the ordinary kinds. All door hinges, or nearly so, are made with single joints; the flaps of the hinges are only equal in length with the joints, so that a 4-in. hinge consists of two 2-in. flaps ; they are generally of iron, broad like projecting butts, and have ornaments as a rule at the top and bottom of the joints. I saw among the Russian brass foundery some really good and strong cover-plate butts, very cleverly made, and polished, equal to our best class of brass hinges. This was a surprise ; but Russia, in all her hardware, approaches nearer to the English makes than any other country.

BRASS FOUNDERY.

In brass foundery were various kinds and qualities, both cast and stamped. Of the *stamped* goods, such as key escutcheons, ceiling roses, curtain bands, and cornices, they were in no respect equal to our common Birmingham qualities. I was much disappointed in the design and general appearance of the German stamped goods, and with this, I think, we may venture to dismiss them. I may add that I do not think they were representative specimens; certainly they are not worthy to be named in the same category as our own. But all the Austrian, German, and French *general brass foundery* goods are as a rule light for actual utility, and like those of our second-rate makers. Hat-and-coat hooks were even lighter than our common, and nearly all made of ornamental tube. If our patterns of cheap goods were not already more than profuse, I would like to see a few patterns of ornamental ones *japanned*, with either brass or china knobs. I saw a few, and they looked well as an assortment, and would, undoubtedly, "take" here. Those who crave after the "cheap" will find caterers to their fancy almost *ad libitum*, so long as there remains any elasticity at all in ideas, in originality and method of contrivance, the natural results of competition. But in the advanced styles of brass foundery, whether by Austria or France, there is not very much left to be desired in an artistic sense. Handles for swing doors, lever lock handles, cabinet and drawer handles, in gilt, ivory, and bronze, are among the most beautiful productions of the kind I ever saw. They are, doubtless, very expensive, as there appeared to be no stint of labour bestowed upon them, and a study for those who desire to emulate their artistic excellences.

In *Plumbers' Brass Foundery* the two exhibits by Continental firms examined by me were Austrian. The makers had been too sparing of the metal; it must have required some tolerably clever coring to produce several of the objects so light. Some of the locks and unions were of immense size. The screwing and general fitting appeared to be very carefully done. What most struck me in connection with this class of work was, such a saving was effected in metal. They should be tolerably low in price, always assuming there is the same amount of machinery employed as we should use in similar productions; but whether this be so or not, hand labour is cheap enough in Austria to enable the Austrians to compete with us in this respect, for really good and substantial workmanship in plumbers' brass foundery, looking at it from a buyer's standpoint. We appear to maintain our position intact as regards substantiality and excellence.

FURNISHING IRONMONGERY.

Furnishing ironmongery requires a very brief notice here, as there is little we require to *know*, after looking at our well-stocked kitchens, in comparison to the variety or the quality exhibited by our competitors at the Exhibition. The quality of the tin wares for trade purposes was very indifferent, and caused me some disappointment. I had gone there prepossessed with an idea that the Germans certainly excelled us in this line. The disappointment was an agreeable surprise. I am sufficiently patriotic to wish that we may never be excelled; it is always a pleasure to know in what we do excel. No doubt these tin goods were *cheap*, perhaps cheaper than those of our common makers; but they looked coarser, and, as far as I could judge, were made of an inferior quality of tin; whilst *ours* would evidently scarcely exceed them in price, have a decidedly cleaner appearance, and appear to be made of finer tin. I am, however, not prepared to say anything in a technical sense; this will be amply done by a colleague, who will treat it as a *speciality*. (See Report of Henry Bishop on "Tin Wares and Japanned Goods.") A "buyer" must, nevertheless, have an eye to the strength and appearance of the article, as well as compare its value with others; my opinion is given accordingly. It may be possible for foreign merchants to sell the German tin ware even in preference to our own, but only in such cases where a fractional difference in *price* is important and the goods can be shipped direct without trouble to the merchant. Wages are very low in Austria and Germany, and material such as we saw should be cheaper than our own, hence we might expect their tin goods to come ultimately a little lower in price than any we could produce.

TOILET WARE.

Of toilet ware and general japanned goods there were but few exhibits; these were of an astonishingly plain kind, chiefly German. I have little to report on these, however, as the very limited view I took of the exhibit would preclude any opinion as to price or trade qualities being given.

GALVANISED IRON WARES.

Galvanised iron wares are scarcely known. Zinc is largely used for buckets, tubs, &c. I was told the price of a 13-in. zinc bucket, seamed, with hoop bottom and plain wire bail, stamped ears, would be as near as possible 2s. 3d., retail price. The zinc could not have been heavier than about 26-gauge metal. In brass culinary wares, Prussia, Russia, and Turkey were the principal exhibitors, those supplied by Prussia being common, for cheap trade.

BRAZIERY AND COPPER WARES.

The brass kettles generally had copper bottoms, which had the appearance of being "spun" on. These had plain brass handles made out of stout sheet metal. These kettles have no resemblance in quality to our own, but would doubtless be much cheaper. The copper bottom is a desideratum at all times, of which probably the Germans are well aware. Kettles with "wells" are commonly used on the Continent; they are similar to those recently introduced in Birmingham, and are used chiefly for cooking ranges. The Russians and Turks compete with each other in this industry; the latter having by far the larger variety, in which there are indications of really good workmanship. Bowls, pans, dishes, tea urns, kettles, and pots, &c., &c. are exhibited in great abundance. Those exhibited by Russia are well "paned," and would be a credit to many of our experienced coppersmiths. The examples alluded to would not compare in point of finish with those of English make, as none have the nicely planished surface we give to these articles; but the coppersmiths of the countries named would doubtless produce them at as little cost, and would be well able to supply their home demand as well as we could for them.

COFFEE MILLS.

The Turks also make coffee mills and a number of other useful articles for household requirements, suited for their own necessities. They are rude, but much superior to any I had expected to find.

STOVES.

The use of stoves on the Continent renders fenders and fire-irons unnecessary, but there were a few examples of fire-irons exhibited; these of no interest to this Report. They can scarcely be said to be made except as a special article by Continental makers; at least, as far as I could ascertain.

HOLLOW WARE.

Cast hollow-ware goods were lighter cast than ours, in every kind. Fine cast hollow ware is little used, and nothing of that kind was exhibited. The enamelled ware was very well represented. It has not the hard, glassy appearance such as ours has, but was still very clear, even, and the colours perfect. Rough cast goods were also good, and left the moulds very clear and smooth. Their castings of hollow ware are the *thinnest* I have ever seen, and feel very light and "handy."

WIRE WORK.

Wire work, such as bird-cages, mouse-traps, sofa and chair springs, check springs, chains, &c., &c., were all very good. I think, in respect of chains and other goods, we already go to Germany, and, at present, I fear we shall not be able to do better. Of course, for all but small chains, we rely upon our own industries providing for our markets. How long even this will continue in the face of high prices for material and increased cost of labour, it is difficult to guess; for trade is not so often affected on the Continent by those convulsions which have so sadly marred our own. There is always an evidence to point to, when out of England, that the people of Germany, and of other industrial portions of Europe, are more contented and settled in their work.

STEEL TOYS.

Steel toys are a very important general industry, and which, perhaps over every other, affects us in Birmingham most. We know German goods of this class are extensively used in this country to the detriment of our own better quality. A great quantity of German toys are malleable cast-iron. Compared with our own, in point of quality, they are, at best, not equal to any degree of wear. The quality of the steel with which they are faced is poor, being generally very soft. We can understand how the Germans are enabled to sell them so cheaply, from the fact before-named (malleable cast-iron frames), as well as that the price of German steel is considerably cheaper than Sheffield steel, and, moreover, as in every other industry in Germany, wages are less. This fact reminds me, irrespective of inferiority in the German goods, they are likely to sell more than hitherto in this country. An effort is being made, evidenced in their exhibits at Vienna, to assimilate their steel toys to the English, and also slightly improving their quality, expressly for the English market, and for transportation to our colonies. The recent demands for wages on the part of our workmen, which resulted in advancing the prices of the steel toys on which they were employed, has not been without its effects in Germany. The makers are increasing their exertions, and filling up steadily, but perceptibly, the gap in the demand for *our* goods with their own. It is to be feared, as a consequence in our own centres, orders for English steel toys will not again be likely to stand on makers' books for twelve months unexecuted; if not indeed the very reverse. Germany possesses every facility for doing an immense trade in every possible kind of steel goods, joiners' and other tools.

Anvils, Vices, &c.—The anvils were simply heavy, rude masses of iron, having no compactness or shape about them. The bick or horn partakes of no precise shape, "neither round, oblong, nor oval." The face of the anvil is rarely flat; some examined by me were decidedly uneven. An English workman on such anvils could not possibly obtain the flatness or squareness in his forgings for which he is justly noted. Of smiths', engineers', and other vices, there were very few; these chiefly small.

The *Edge Tools* are of a very peculiar shape all throughout, but their mode of using them differs very much from ours, and, no doubt, the Austrians think theirs as serviceable, or, perhaps, more so.

AGRICULTURAL IMPLEMENTS.

The *Spades*, for the shape scarcely varies, whether we call them spades or shovels (rather, those that I saw were for digging), were not unlike our shovels in the blade, only more abruptly pointed. They are exceedingly thin, and are made entirely by hand. They are so thin, in fact, that it is necessary to make them all "treaded,"* for the double reason of saving the foot and giving strength to the blade. The one gauged by me was about No. 13 sq. at its thickest part. The tread is in one piece with the blade, and is simply turned over after the blade is formed. The sockets are of one piece also with the blade, and of uniform thickness. These appear to be the most awkward of articles. The "trees"* of the spades are about 4 feet long, and "plain as a pikestaff," having neither crutch nor eye-handles, &c. These spades, or shovels, were invariably black, and very rough, without any sharpness on the edges, or signs of grinding whatever. *Hoes*, on the contrary, are all bright, so unlike any used for a similar purpose in this country. There were some similar to a very light "mammote," measuring about 9 by 8 inches, with square sockets; others similar to East India necked hoes, and shaped at the shoulder, are about 9 inches deep. Others again are pointed shovel-shape, measuring about 9 by 10 inches, with ferrules; some again are heart-shaped, about 7 by 9 inches, ribbed down the centre to a point, with square eyes; and there were also triangular hoes. All these were very rude, as indeed was everything relating to edge tools, leaving ample room for enterprise, and to teach the people better, quicker, and more effectual methods of husbandry. *Prussian Forks* are very similar in shape to our own patterns, but whether for hay, dung, or digging, all have the same straight handles. They are made of any ordinary number of prongs, in square, round, or diamond shapes; there is generally a deep ferrule fixed on the handle, and a washer with square hole, which exactly fits the end of the ferrule through which the tang is driven up the handle. In none of the *edge tools* did I see any approach to such improvements which we have occasion to notice daily among our various makers. I do not know what facilities the Germans have for production, but should think there would not be much room for the introduction of ours, excepting those on the most modern and approved principle; for instance, that of the changeable blade and tubular tree, also the centre strapped, &c. (These are improvements belonging to spades and shovels mainly, I am aware of; still there are improvements in forks that might be made available for the same market.) Several very good exhibits by Prussia of *heavy edge tools*, including adzes, hatchets, pick-axes, miners' picks, &c., as good as any I have yet seen, if the metal is good. They were forged articles, looked good, and formed a singular contrast to the Austrian edge tools.

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* That is to say, with longitudinal strengthening on the part where the foot is placed in using the spade.

Scythes, *Hooks*, *&c.*, are of a very peculiar kind, being all hammered out of the solid by hand; every mark of the hammer is left in the blade. The one example now in my mind, which would illustrate the whole, is 21 inches long and 2½ inches wide, and has been hammered out of a bar of steel 1¼ inch thick, sufficient being left to form the "tange" to turn down at the end, which is attached to handle or stick. There is, however, a solid square bead left all along the back of the scythe, to give it the required strength. These scythes are not ground, but slightly smoothed over, and hardened and brought back in "temper," as they had a blue appearance, showing that they had been heated for some purpose. Bagging hooks, &c., &c., were made on the same principle, and in all points appeared as rude, and as different from our own, as it was possible to conceive. The method of sharpening these scythes, I noticed, was to "pane" them up a little, very close to the edge, and then slightly pass the stone along.

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* Trees are the shanks or handles.—Ed. *B.A.R.*

PLATELAYERS' TOOLS

Were very good, but only a couple of exhibits; they were of German manufacture. The beating picks appeared to be much weakened through the largeness of the eye or the socket; others were similar. There was nothing particularly noticeable in their goods; and besides, the assortment, in each case, was very small indeed, and not equal in appearance to the heavy edge tools above.

BOLTS AND NUTS.

There were several small, but very good, assortments of bolts and nuts. The forging, and screwing, and fitting of the nuts were highly creditable. Those from Leipzig were particularly applicable for railway purposes, such as bolts, nuts, rivets, spikes, doghead spikes, fish bolts, &c., &c., and were as well made. There were also a few from the Westphalia district and Baden. The Swiss also exhibited a few, including some pretty fair quality *coach screws;* the threads of the screws were, perhaps, not so deep or well cut as those of our best makers, but they were, on the whole, very good. This appears to be an important industry, though I do not think their producing powers are equal to ours, and prices are higher somewhat, no doubt. There was some excellent work in small screws exhibited by a Baden firm; they were "metal threaded" screws for clocks, watches, musical instruments, &c., &c., in brass and iron—cheese-headed, round, and conical-headed; also band or strap screws, very well turned and screwed. It is matter for astonishment, with all their appliances for turning out these small special kind of screws so beautifully, ordinary Continental *wood screws* should be so very inferior.

IRON SAFES.

It is my impression we are being surpassed on the Continent in this very important branch of manufacture; or at all events, our pre-eminence is being challenged. The principle of construction generally adopted in the examples exhibited by Continental makers is that of the double door. The outer door is about ⅝ inch thick, cased with steel, and barred; the inner door is about 4 inches thick, fire proof. Both doors are made to work on the same hinge, and have the appearance of one compact door when opened and shut. The inner door is fitted with bolts, and otherwise secures the safe; the outer one is in itself a barrier to the would-be burglar, having a secure lock, and attaches itself by other means to the inner door and the sides of the safe. The bolts shoot cornerwise, thus securing all the sides of the safe at the same time. There were other principles of fastening illustrated, but all pretty nearly similar to the above. The safes were thoroughly well made, with an immense power of resistance alike to the manipulations of burglars and protection against fire. The French safes, over and above the arrangement of double doors, presented the novelty of a safe within a safe; that is, the inner one, which was fire-proof, rested upon feet at various points, and was separated from the outer by about three or four inches, being walled in, as it were, by the solid heavy outer case, suggesting the destruction of the outer before any possible attempt could be made to force the inner safe. Another consideration worth our notice, in respect to Continental safes, is that externally they are stripped of every attribute which generally distinguishes a safe. The Viennese, German, and French do not invite attempts on the part of skilled burglars and safe-breakers, nor stick large plates on the most prominent points, "Burglar Proof," "Thief Proof," &c. These safes are made to imitate some best pieces of drawing-room or dining-room furniture, as cabinets, sideboards, cheffoniers, and even wardrobes. Their appearance is light, elegant, with all the artistic decorations introduced on best furniture, made of the most valuable woods. The inside fittings, the drawers, and racks, and shelves, are all well arranged and decorated; and what the heavy, massive, defiant characters of our safes has failed hitherto to avert, may after all be averted by the simple and elegant wood attire put on by Continental safe-makers.

ENGLISH IRONMONGERY.

After days spent in the examination of the products of Continental industry, it was agreeable to turn into the

English Section of the Exhibition; the time, however, spent among our English products was very limited, and but little space will, necessarily, be occupied by any remarks I may make upon those products. It was, in the first place, noticeable, that in respect of a large number of articles exhibited by Continental manufacturers, the comparisons with our own were not in their favour. But we may not forget the fact that in most of the countries whose exhibits have been alluded to by me, we have worthy and honourable competitors in a very large number of industries, and these, as compared with the exhibits of the same countries a few years ago, point a powerful moral, and ought to stimulate us to renewed exertion, in order to maintain our hitherto proud position among the producing nations of the world. It needs to tell what may be the consequence to our future trade unless we fully prepare ourselves for this rivalry, which is confirmed by the Vienna Exhibition. But to return to the British exhibits. The hardware portions were very few indeed, and English industry must therefore sacrifice a little credit in consequence; a couple or so of Birmingham exhibitors in hardware doing what should have been done by manufacturing firms in this town and Wolverhampton,—as exhibitors who have formerly been very successful in carrying off awards at International Exhibitions were altogether absent.

The ironmongery goods exhibited by Messrs. Collings and Wallis are of the ordinary best class, without any pretence to extravagance or speciality in any of the articles, being intended to show what we deem useful for everyday purposes.

Messrs. Schletter, of this town, also exhibited a case of articles, but not so extensive as those of Messrs. Collings and Wallis, although better selected perhaps as to those kinds of manufacture likely to meet the Austrian requirements.

Messrs. John Rabone and Sons, of this town, had a very excellent display of rules in box and ivory; spirit and plumb levels, measuring tapes, squares, &c. &c. In this collection there were no duplicates, and it consisted of the most useful, substantial, and merchantable goods for all purposes.

The Patent Nut and Bolt Company exhibited in a case a complete illustration of its trade, which would doubtless commend itself to the attention of engineers and others interested in railway plant. There were numerous and excellent examples of Sheffield specialities which stood out in a severe contrast with the many German exhibits of the same class. Among these were Messrs. Spear and Jackson, Pearson, R. Smith and Co., Ward and Payne, &c. There is a large quantity of Sheffield goods sold on the Continent, but always where a really good quality and not price is concerned. A few japanned goods of very good quality were exhibited by Messrs. Perkins and Son, of London, which was the only special exhibit I saw in this manufacture of locks, apart from the general kinds contained in the Birmingham ironmongery cases. There was an exhibit by Messrs. Hobbs, of London, the principles of whose patents are already known to us; but they looked decidedly bare and cold compared with those already referred to in the Viennese, French, and other sections. The quality was, however, undoubted. Messrs. Chatwood, of Bolton, also exhibited some of their patent locks, which were very substantial, but not attractive, and, as far as I could see, no opportunity was afforded for examining into the principle of their locks.

Iron Safes.—Messrs. Milner, of Manchester, and Chatwood, of Bolton, exhibited some good English examples, though they lacked refinement. They are what they seem—English safes!

Malleable Nails were exhibited in every variety, and of excellent quality, by Mr. Thomas Francis, of this town.

English Edge Tools.—There were a number of very fine exhibits in this class, containing every needful variety, and must have suggested to any careful examiner that in this and other respects the English were eminently practical and utilitarian. I do not doubt, with a reduction of the heavy tariffs usually imposed on this class of goods (as indeed upon *every* class of goods), by Germany and Austria, but we may be enabled to push a large trade in these countries, and I feel assured *this* Exhibition will materially assist in opening up foreign markets for our metal manufactures.

CONCLUSION.

As before stated, it would be simply impossible to include in this Report more than a bare moiety of the articles in which we in Birmingham are deeply interested; and of the greater portion of those alluded to, it was not possible to make any comparisons as to prices, or scarcely to obtain prices at all, for reasons already explained. Some articles in the ironmongery trade I have not even named; others are only alluded to, which is due in a great measure to the fact that they are *specialities* which will be dealt with more fully in the reports of other Birmingham artisan reporters, with whom I was privileged to co-operate in the work entrusted to us by the Birmingham Chamber of Commerce.

PART III.

ADVERTISEMENTS.

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Paris, 1867.

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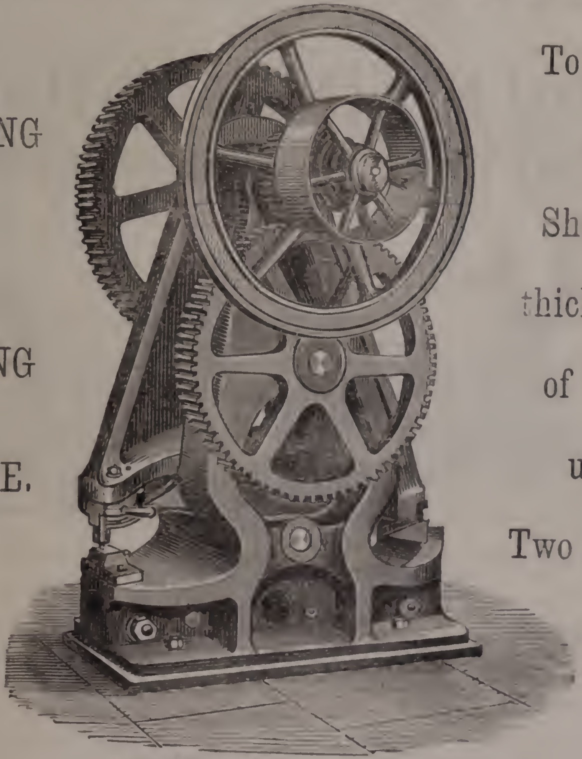

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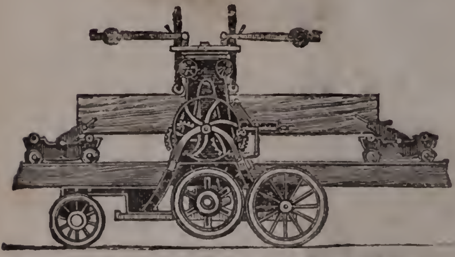
SAW MILL ENGINEERS

AND

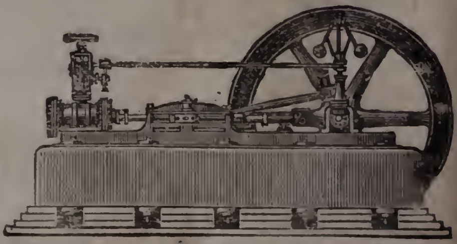
WOOD-CUTTING MACHINISTS,

Rochdale, near Manchester.

LONDON OFFICE: 84, CANNON STREET, E.C.



Patent Portable Log and Deal Frame.



High-pressure Horizontal Steam Engine.

MANUFACTURERS OF TIMBER AND DEAL FRAMES, Planing and Moulding Machines, Circular Saw Benches, and every description of Wood-working Machinery. High-pressure Condensing and Compound Steam Engines, Steam Boilers, Shafting, Gearing, &c.

Complete Sets of Machinery designed and arranged for Saw-mills, Planing and Moulding Mills, Builders, Contractors, Shipbuilders, Carriage and Wagon Works, Railway Companies, Government Arsenals, Dockyards, &c.

T. R. & Sons invite intending purchasers to visit their Works at Rochdale, where complete Sets of Sawing and Wood-working Machinery may daily be seen in operation. They can also show a complete Set of upwards of fifty Machines, made specially for Railway Carriage and Wagon building, combining all the latest improvements, in operation at a short distance from London.

VIENNA EXHIBITION, 1873,
Prize Medal awarded for

CIRCULAR SAWS.

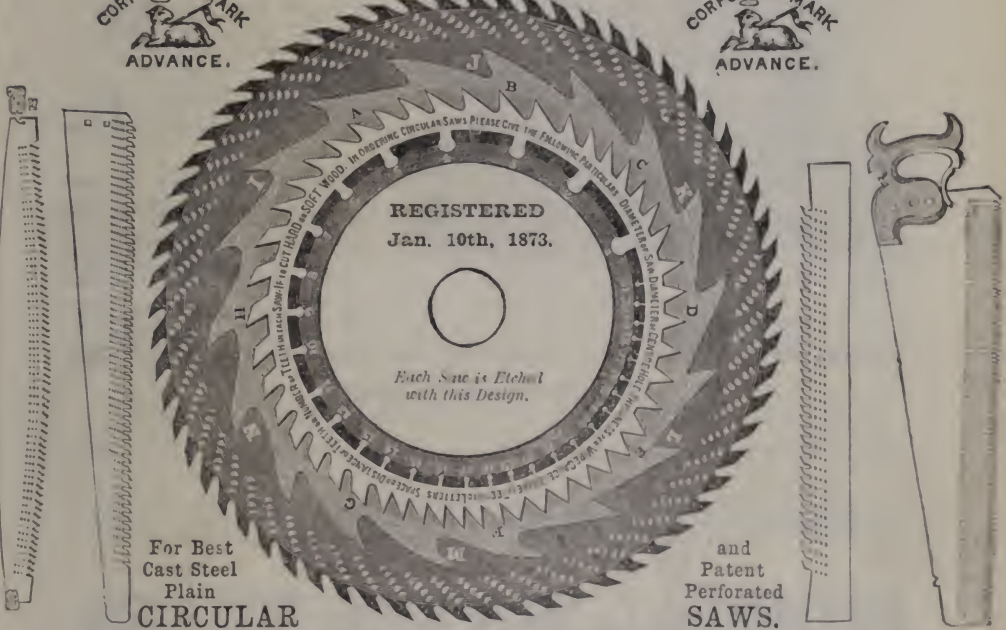
FRANZ JOSEPH I. KAISER VON OESTERREICH KOENIG VON BOEHMEN ETC. APOST. KOENIG VON UNGARN.

TAYLOR BROTHERS'

REGISTERED COLLAR ETCHING.

CORPORATE MARK
ADVANCE.

CORPORATE MARK
ADVANCE.


REGISTERED
Jan. 10th, 1873.
Each Saw is Etched with this Design.
IN ORDERING CIRCULAR SAWS PLEASE GIVE THE FOLLOWING PARTICULARS
DIAMETER OF SAW. DIAMETER OF CENTRE HOLE
IF TO CUT HARD OR SOFT WOOD.
A
B
C
D
E
F
G
H
I
J
K
M

For Best
Cast Steel
Plain
CIRCULAR

and
Patent
Perforated
SAWS.

Ground by Patent Machinery, showing Shapes of Teeth, Index Letters, Wire Guage and Instructions for Ordering.

ADVANTAGES OF PERFORATED SAWS (Patent No. 2579).—Great **Saving** of **Files.** Effectually **Prevents Expansion.** Half the amount of **Filing saved.** Liability to **Fracture** done away with. Keeps the Teeth of **Uniform Size.** Serves as a **Guide** to the Filer. Perforations **cut out** bulk of what is generally **filed** away. Frequent **Re-gulletting** saved.

Manufacturers of Saws, Steel Files. Edge Tools, Machine Knives, Matchets, Cane Knives. &c.

Circular Saws for Wood Cutting Machinery, equally balanced, and warranted to run true.

Mill Saws, Mill Webs, Cross Cut, Pit and Frame Saws, specially tempered and warranted best quality.

Short Saws of all kinds, with plain and ornamented Handles, Brass and Steel Plates, Etched Blades, &c. Combination Hand Saws, comprising Two-foot Rule, Brass Plated Square, and Straight Edge.

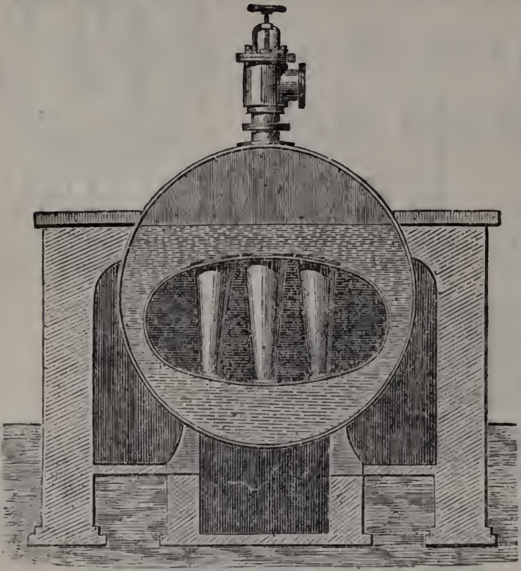
MARKS—"*Taylor Brothers',*" "*J. Taylor & Son,*" "*J. & I. Taylor,*" "*Adelaide Saw Works,*" *and* "*Melvin.*"

All Saws Toothed, Ground, Glazed, and Polished, by the most recent improved Patent Machinery.

CIRCULAR SAWS MACHINE GROUND UP TO EIGHT FEET DIAMETER.

ADELAIDE SAW AND STEEL WORKS, SHEFFIELD.

STEAM BOILERS AT THE VIENNA EXHIBITION.



Section of "Galloway" Boiler, showing arrangements of back flues, the furnaces being of the same construction as in the common two-flued boiler.

THE

Diploma of Honour

(Being the highest distinction)

Has been Awarded to the

"GALLOWAY" STEAM BOILER.

The attention of Boiler Owners is specially directed to the superiority of this over every other description of Boiler for Economy and Durability.

Upwards of 3,000 now working in the United Kingdom and on the Continent.

Prices and all other particulars will be sent on application to the Patentees.

MAKERS OF THE

"GALLOWAY" CONICAL WATER TUBES.

These Tubes are readily inserted into the Flues of existing Boilers, and promote economy of fuel, ranging from 15 to 25 per cent., increased circulation of water and durability.

These Tubes have now been in use for Twenty Years, and above 130,000 are now in work.

They can be fixed by any Boiler Maker, but can only be obtained from the Patentees,

W. & J. GALLOWAY & SONS,
KNOTT MILL IRON WORKS,
MANCHESTER.

MATHER & PLATT,

ENGINEERS,

Salford Iron Works,

MANCHESTER,

Patentees and Makers of

STEAM EARTH-&-ROCK-BORING MACHINES

For Artesian Borings and Mineral Explorations.

Improved Pistons and Air Pump Buckets.

HOT AIR SIZING & DRYING MACHINES.

Iron and Brass Valves and Taps for Steam, Water and Gas.

IMPROVED MACHINERY FOR EACH OPERATION IN CALICO PRINTING.

Bleaching, Dyeing and Finishing Machines,

In every variety and detail, for Cotton, Linen and Woollen Goods.

ALEX. WILSON & CO.,

ENGINEERS,

Vauxhall Iron Works,

WANDSWORTH ROAD, LONDON, S.W.

MANUFACTURERS OF THE

"VAUXHALL DONKEY PUMPS."

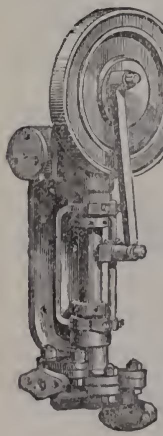
Prize Medals:
HAVRE AND NAPLES MARITIME EXHIBITIONS;
LONDON AND VIENNA INTERNATIONAL EXHIBITIONS.

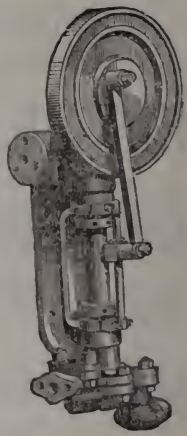
Manufacturers of Bilge and Water Ballast Pumps, Railway Station and other Pumps, Steam Stop Valves, Escape Valves, Check Valves, Foot Valves, Safety Valves, and other Fittings.

SCREW ENGINES AND BOILERS FOR LAUNCHES, TUGS, AND LIGHTERS.

The special attention of all users of Steam Power is called to the "VAUXHALL DONKEY PUMPS," which are the only reliable Donkey Pumps in use. They are patronised by all the leading Shipbuilders and Engineers, and can be obtained from any Steamship Furnisher at home or abroad.

Over 3,000 of these Pumps are now in use on board Yachts and Steamships, in Breweries, Distilleries, Tanneries, Paper Mills, Cotton, Woollen, and other Spinning Mills, Bleach-works, Dye-works, Chemical-works, Saw Mills, Collieries, Iron-works, Mines, and many other places where steam is used. 100 per month are now being sold.





REVISED PRICE LIST.

Size.	Diam. ins.	Stroke. ins.	Gallons thrown per Hour.	Horse-power of Boiler supplied.	Price.
4	1¼	2½	120	8	£7 10 0
5	1½	3	200	12	10 0 0
6	1⅞	4	300	20	13 0 0
7	2¼	4	450	30	15 0 0
*8	2¼	4	700	40	17 10 0
9	2½	6	1000	60	20 0 0
*10	2½	6	1500	100	22 10 0
*12	2¾	6	2000	120	30 0 0

Those marked (*) are double action.

A LARGE STOCK ALWAYS ON HAND, FROM WHICH ORDERS CAN BE EXECUTED WITHOUT DELAY.

FRANZ JOSEPH I. KAISER VON OESTERREICH, KOENIG VON BOEHMEN, ETC. APOSTL. KOENIG VON UNGARN

VIENNA, 1873,
FOR PROGRESS.

THE
COALBROOK-DALE COMPANY
Shropshire,

IRON-FOUNDERS.—*Specialities:* Entrance Gates, Fencing, Verandahs, Balconies, Tomb and other Railing, Fountains, Vases, Garden Chairs, Monumental Erections, Statues, Cooking Ranges, Stove Grates, Fenders, Hall Tables, and Ornamental Castings generally; COLONIAL CASTINGS, STEAM-ENGINES, BOILERS, MACHINERY, &c. &c.

LIST OF MEDALS.

SOCIETY OF ARTS,	1787—The Gold Medal, to Mr. Darby, for the Iron Bridge.
,, ,,	1849—The Gold Medal, for Castings.
THE EXHIBITION,	1851—The Council Medal (Class XXII.)
PARIS,	1855—Two First-class and one Second-class Medals.
INTERNATIONAL,	1862—Bronze Medals (Class XXXI. and Class X.)
VIENNA,	1873—The Medal for Progress (Class VII.)

PLATT, BROTHERS & Co., Limited,
HARTFORD WORKS,
Oldham, near Manchester.
ENGINEERS, MACHINISTS, MILLWRIGHTS, IRON & BRASS FOUNDERS, FORGE IRON MANUFACTURERS, &c.

OFFICES:—
HARTFORD CHAMBERS, 5, ST. ANN'S SQUARE, MANCHESTER; and
7, ROYAL BANK PLACE, GLASGOW.

Machinery for opening and ginning seed cotton.
Machinery for preparing, spinning, and doubling cotton, wool, and worsted.
Machinery for carding and spinning silk waste.
Power looms for all descriptions of plain and fancy cloths in cotton and wool.
Sizing, dressing, warping, beaming, winding, and reeling machinery.
Cloth folding and measuring machines.
Hydraulic and cam bundling presses for yarn and cloth.
Combing machines for cotton—Heilmann's or Whipple's patent.
Combing machines for worsted—Little & Eastwood's patent.
New patent cleaning machines for cotton.
Crighton's patent opening machines for cotton.
Hard waste breaking-up machinery.
Patent burring machines for wool.
Patent brick-making machinery.
Forging machines, horizontal and vertical drilling machines, planing machines, shaping machines, cropping machines, saws, and other tools for mechanics' and smiths' shops.

By Her Majesty's Royal Letters Patent.

VIENNA, 1873. MOSCOW, 1872.

LONDON, 1862. PARIS, 1867.

GREEN'S PATENT

FUEL ECONOMISER,

FOR STEAM BOILERS & FURNACES.

The only Prize *given at the* Vienna Exhibition *for* Fuel Economisers *has just been awarded to* EDWARD GREEN & SON, *of* 14, *St. Ann's Square*, *Manchester, and at Wakefield.*

THE GRAND GOLD MEDAL AT MOSCOW AND PARIS WAS ALSO GIVEN THEM.

This Apparatus, after having been applied to all sorts of Boilers, and subjected to every variety of trial through a long period of years, still holds its position as the best and most efficient means of Heating the Feed Water with the Waste or Residual Heat from Steam Boilers, and thus effects a positive SAVING OF FROM FIFTEEN TO TWENTY-FIVE PER CENT. OF THE FUEL, besides considerably reducing the "wear and tear" in the working of the Boilers, by furnishing, as it does, a constant supply of Feed Water at a high and uniform Temperature.

The recent Improvements in the ECONOMISER, especially in the self-acting Scraping or Cleaning Apparatus, render it still more worthy of general adoption.

N.B.—The ECONOMISER is now in successful operation to more than 2,500,000 Horse-Power, and giving universal satisfaction.

List of References, with numerous Testimonials, may be had from the Original Inventors,

EDWARD GREEN & SON,

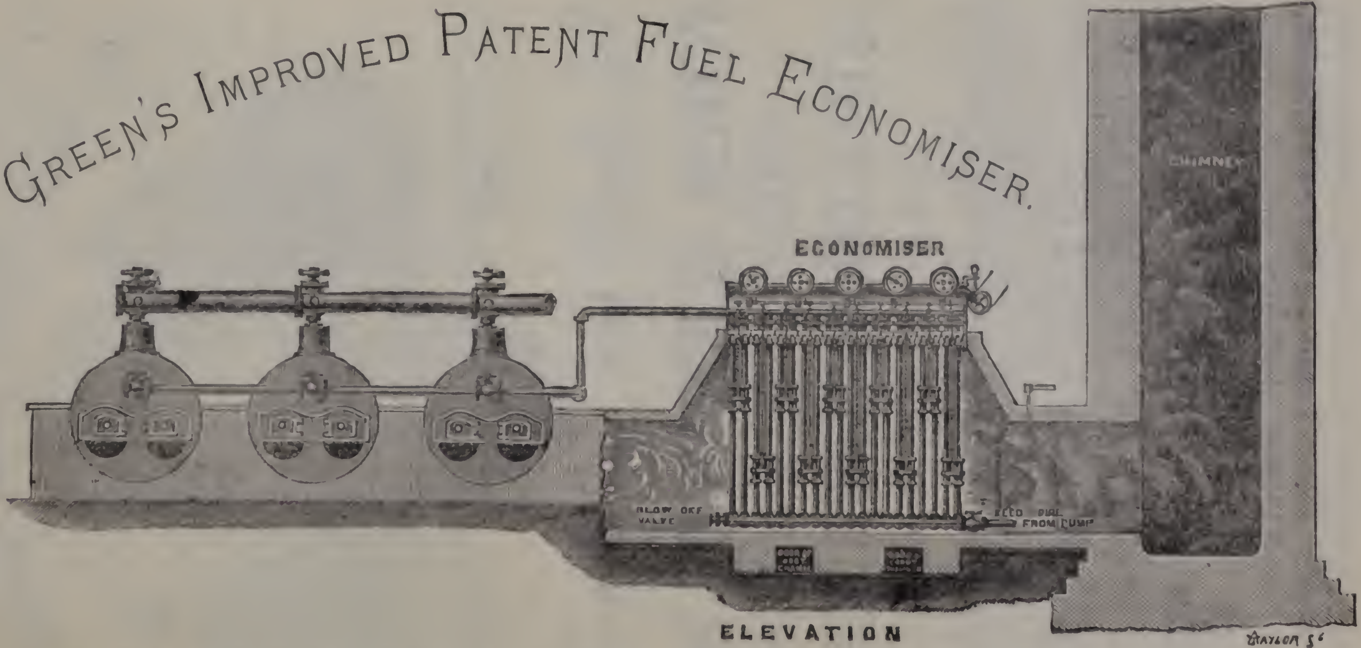
Patentees and Sole Makers,

WAKEFIELD.

Offices: 14, St. ANN'S SQUARE, MANCHESTER.

Also at London, Glasgow, and Dusseldorf.

GREEN'S IMPROVED PATENT FUEL ECONOMISER.



The only Economiser for which an award was given at the Vienna Exhibition, 1873.

EDWARD GREEN & SON, 14, ST. ANN'S SQUARE, MANCHESTER.
Works: WAKEFIELD.

ESTABLISHED 1710.
ALSO MEDAL OF MERIT VIENNA EXHIBITION, 1873.

ALSO MEDAL OF MERIT VIENNA EXHIBITION, 1873.

JOHN KENYON & CO.,
SHEFFIELD, ENGLAND,
STEEL CONVERTERS & REFINERS.
MANUFACTURERS OF ALL DESCRIPTIONS OF
Cast, Shear, Bar, Spring, and Sheet Steel,
SAWS, FILES, EDGE TOOLS,
MACHINE KNIVES, &c., &c.
GENERAL MERCHANTS.

(CORPORATE MARKS, IK **KENYON, SHEFFIELD,** *and* MG **MIDDLEWOOD, SHEFFIELD.)**

FOREIGN AGENTS:—

CLEMENTZ & CO.	St. Petersburg.	GEORGE KELLNER & CO.	Odessa.
F. A. KAEMPFFE	Riga.	A. G. REDPATH	Oporto.
KREIBIG & FINGER	Lisbon.	A. RACK & CO.	Vienna.

"THE UNIVERSAL" STEAM PUMP.

No Tappets,
Springs,
Rods or Gear.

Requires
No Foundation,
can be slung
on Frame
in Pits.

AWARDED THE
HIGHEST HONOUR
AT THE
VIENNA EXHIBITION
1873.

Specially
Constructed
to Pump
Gritty Water,
Hot Liquor,
Tar,
Sewage,
&c. &c.

Selected by the Royal Commissioners of the British Department at the Vienna Exhibition, for the supply of their Steam Boilers, and also exhibited on the stand of the

Sole Makers:

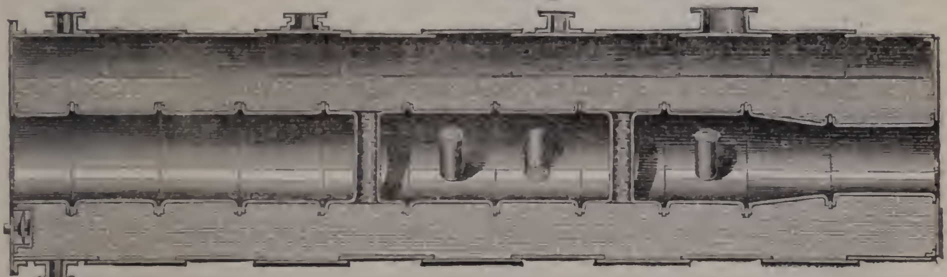
HAYWARD TYLER & CO.
84 & 85, WHITECROSS STREET, LONDON, E.C.

JOHN FERNIHOUGH & SONS,

VICTORIA IRON WORKS,
DUKINFIELD, NEAR MANCHESTER,
MAKERS OF EVERY DESCRIPTION OF

HIGH PRESSURE IMPROVED LANCASHIRE BOILERS.

With Flues, made of Solid Welded Rings and Anti-Collapsive Flanged Seams, with Cross-Water Tubes Welded in, having no Rivets inside the Flues.



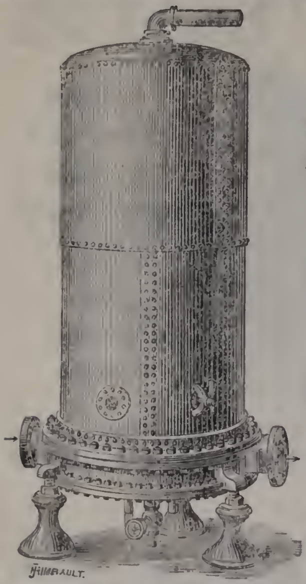
This Boiler is more economical in raising Steam than the ordinary construction, has more elasticity in the flue joints, and capable of greater resistance to the compressive force, thereby strongly commending itself to Steam users.

BONE, SUGAR, SOAP AND OTHER PANS. KIERS, BOILER MOUNTINGS, &c., &c.
SHIPPING ORDERS RECEIVED THROUGH MERCANTILE HOUSES.
ESTABLISHED 1815.

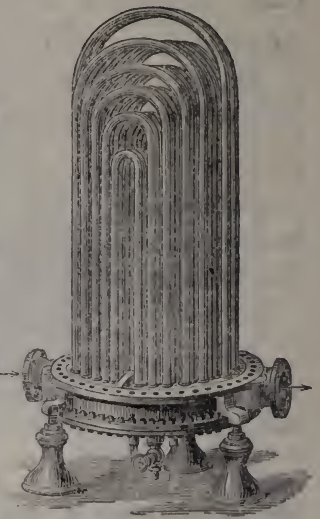
FEED WATER HEATER

FOR

STEAM BOILERS



Berryman's Patent Excels all others.



R. BERRYMAN

28, Wilson St.

FINSBURY,

LONDON, E.C.

Hundreds of these Heaters have been in use for Three Years, and are constantly being adopted by many eminent Engineering Firms in both England and America.

Send for Free Catalogue, describing Boiler-feed Regulator, Steam Trap, &c.

WILLIAM BOULTON,

ENGINEER, BURSLEM,

Inventor, Patentee, and Manufacturer of latest improved POTTER'S MACHINERY, **also for making** ENCAUSTIC TILES, **and for improvements in** HEATING DRYING ROOMS **by Waste Steam,** guaranteed without causing any back pressure.

TESTIMONIALS AND PRICES ON APPLICATION.

HARTLEY & SUGDEN,

MANUFACTURERS OF

WROUGHT WELDED BOILERS,

For Hot Water Heating Apparatus and Kitchen Ranges, including all Patterns of Saddle, Cylinder, and Back Boilers.

"GOLD MEDAL" **Awarded at Royal Horticultural Show, 1872, for Best Hot Water Boiler.**

Original Makers of the Patent Independent Dome Top, Tank, Crown, Atlas, Phœnix, and other really Economical and Powerful Boilers.

All Boilers Tested to High Pressure before leaving the Works.

ATLAS AND PREMIER BOILER WORKS, HALIFAX.

TWIBILL'S FUEL ECONOMISER,

WITH

PATENT DOUBLE-EDGED

AND

SELF-ACTING SCRAPERS,

Proved at 500-lb. per square inch, uses up the waste heat from Steam Boilers, and supplies them with superheated feed water, varying in temperature from 212 to 350 degrees Fahrenheit, thereby reducing their wear and tear, and effecting a saving of 20 to 30 per cent. in fuel; can be applied without stopping the works, or interruption to ordinary operations.

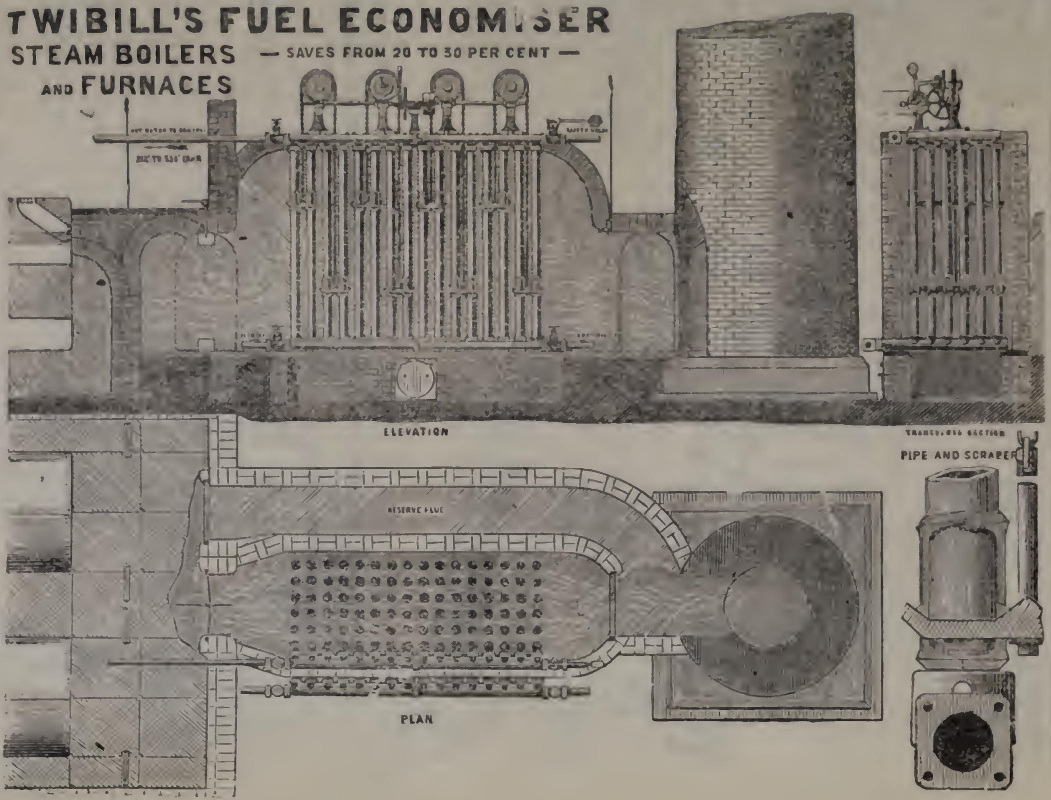
Hundreds are at Work, and to every kind of Boiler.

JOSEPH TWIBILL,

Patentee & Sole Maker,

SUTTON STREET, HULME,

MANCHESTER.


TWIBILL'S FUEL ECONOMISER
STEAM BOILERS — SAVES FROM 20 TO 30 PER CENT —
AND FURNACES
ELEVATION
RESERVE FLUE
PLAN
TRANSVERSE SECTION
PIPE AND SCRAPER

F. ERSKINE & Co.'s Patent Improved

FUEL ECONOMISER

IS THE CHEAPEST AND MOST EFFICIENT;

Perfect Circulation through Pipes and Boiler, and no Obstruction to Draught in Flue.

QUEEN'S IRONWORKS,

50, Withington Street, Pendleton, Manchester.

To Her Majesty the Queen and H.R.H. the Late Prince Consort, and Their Royal Highnesses the Prince and Princess of Wales.

Watson's Self-Acting Syphon Ventilators.

HILL & HEY,

VENTILATING ENGINEERS

HALIFAX, YORKSHIRE.

SUCCESSORS TO CHARLES WATSON, Esq., F.R.S.A., &c., the Inventor and Patentee, and by apppointment **SOLE MANUFACTURERS** of his now well-known and valuable Ventilator, with all the latest improvements **in form and application,** the only effectual and satisfactory system of ventilation without violent draught.

These Ventilators have been applied to nearly the whole of Windsor Castle, and the Royal Stables at Windsor, and to Sandringham, for H.R.H. the PRINCE OF WALES.

☞ To remove inducements to use worthless imitations and inferior Ventilators, sold by those who know little or nothing of the subject or its application, HILL & HEY now manufacture these Ventilators at REDUCED PRICES, and the prices are as low as possible, consistent with strength and good workmanship—strength and quality is the test of cheapness.

Experience is essential to success in Ventilation. HILL & HEY were the only managers and inspectors of buildings Mr. Watson ever had, and their experience dates from 1853.

H. & H. will forward Mr. Watson's Letter and their Pamphlet, with Testimonials, Designs, and description of the Ventilator on application.

☞ *Beware of parties representing themselves to be who and what they are not, and offering "patent" improvements, where no patent has existed or can exist.*

WORKS—BOND STREET, HALIFAX.

JOHN HOLT,
Inventor and Manufacturer
OF THE
PATENT DRAWN FLAT WIRE CARDS,
For Carding Cotton, Wool, Silk, &c.
Samples and
List of Prices on application to
JOHN HOLT,
School Street Works, off Toad Lane, ROCHDALE

STEAM CULTIVATION.
FOR PARTICULARS OF
JOHN FOWLER & CO.'S
STEAM CULTIVATING APPARATUS,
Apply at Steam Plough Works, LEEDS; or 71, Cornhill, LONDON, E.C.

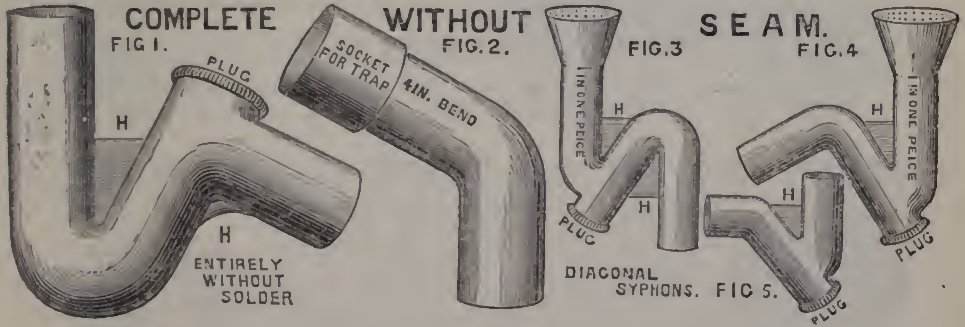
GRICE, GRICE & BOOTH,
INVENTORS AND PATENTEES OF
ORNAMENTAL METALLIC TUBES,
Makers of all descriptions of Brass and Copper Tubing, &c.,
SHEEPCOTE STREET TUBE AND ROLLING MILLS,
BIRMINGHAM.

WRIGHT SUTCLIFFE & SON,
Plumbers & Sanitary Engineers,
Inventors and Patentees, and Sole Manufacturers of their Patent Cast Lead Sink Traps, Closet Traps and Sink Grates, Pumps, and other Bent Pipes, to prevent noxious Gases from entering Dwellings or Mansions through Sinks, or Slop Stones, or Sewers.

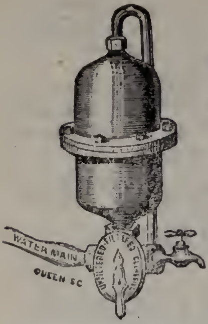
AWARDED DIPLOMA OF MERIT,

FRANZ JOSEPH I. KAISER VON OESTERREICH KOENIG VON BOEHMEN ETC. APOSTL. KOENIG VON UNGARN.
AUSSTELLUNG 1873 WIEN
DEM VERDIENSTE

VIENNA EXHIBITION, 1873.



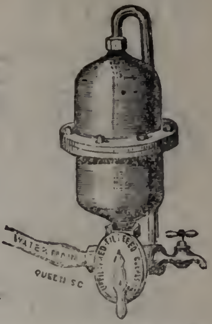
TO BE OBTAINED OF PLUMBERS' MERCHANTS.
Illustrated Price Lists on Application.
Works—GREEN LANE, HALIFAX.



HIGH PRESSURE

PATENT FILTER.

These Filters are made for attachment to the ordinary water main, or the supply pipe from a cistern, or **reservoir** of any description.



The supply of water is regulated by the hand on the dial plate, on which three points are indicated: **Unfiltered, Filtered,** and **Cleansing.**

One great advantage possessed by these Filters for **domestic use** is, that when once fixed up, they not only require no **re-filling** with water, but no water can be obtained unfiltered, unless the hand on the dial plate be turned to the point marked Un-filtered.

They can be **instantly cleansed** by turning the hand on the dial plate from a point thereon marked Filtered to a point marked Cleansing.

For large Houses and Public Institutions, they can be fitted on the Water Main where it enters the building, and will supply filtered water through all the ordinary taps in the building.

They are the **only** Filters that will filter water as rapidly as supplied by the **Water Mains.**

Their use will, to a great extent, prevent the scaling of **Steam Boilers.**

They are self-cleansing; will filter from **200** to **25,000** gallons per day; will cleanse **river water** for manufacturing purposes, prevent river pollution, and take all solid matter out of liquid.

For Further Particulars and Price, apply to the Sole Maker,

J. HALLIDAY.

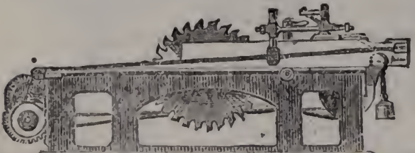
PORTLAND WORKS, NEWTOWN, MANCHESTER.

SOCIETY FOR THE PROMOTION OF SCIENTIFIC INDUSTRY.

President—THE RIGHT HON. THE EARL OF DERBY, D.C.L., F.R.S.

Chairman of Council—HUGH MASON, Esq. | **Secretary**—WILLIAM GEORGE LARKINS, Esq

Offices—11, MANCHESTER CHAMBERS, MARKET STREET.



IMPROVED SELF-ACTING SAW BENCH.

WM. FURNESS & CO.

SAW MILL ENGINEERS

AND

Wood Working Machinists,

GLOBE WORKS, JASMINE ST., LIVERPOOL.

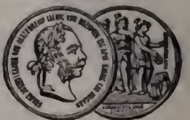
London Office—39, LOMBARD STREET, E.C.

DAVIES'S PATENT SELF-ACTING STEAM STRIKER,

Silver Medal Awarded,

Paris Exhibition, 1867.

Medal for Progress Awarded.



Vienna Exhibition, 1873.

For Forging all kinds of Smith's Work, being capable of taking the place of hand strikers at one or any number of anvils. It will strike in a vertical or horizontal direction, OR AT ANY ANGLE.

These strikers have been in regular use for upwards of seven years, and they have been supplied to Bridge Works — General Engineering Works — Wheelwright Works — Iron Shipbuilding Yards — Stationary Engine Works—Marine Engine Works—Brass and Copper Works —Gun Carriage Works—Gun Factories—Canal and River Works—Bolt and Rivet Works—Collieries—Iron Works—General Smiths' Works—Locomotive Works —Hydraulic Engineers.

Sole Makers—The Crumlin Viaduct Works Company, Limited, near Newport, Mon.

VIENNA EXHIBITION, 1873.
Medals for Progress and Merit.

DOULTON & WATTS,
Lambeth Pottery, London.

STONEWARE MANUFACTURED OF EVERY DESCRIPTION.

SGRAFFITTO JUGS *of Original Shapes and Decorations.*
DOMESTIC STONEWARE.
FILTERS *fitted with Charcoal and Sand Filtering Beds.*
PATENT AIR-TIGHT JARS *with Covers of Stoneware.*

Chemical Vessels to withstand the Action of Acids; Pumps to lift Acids; Perforated Tiles for Draining Off Acids, and for Maltsters.

PLUMBAGO AND OTHER CRUCIBLES. FIRE CLAY FURNACES, LUMPS, ETC.

FINE ART TILES.

SHOW ROOMS—HIGH STREET, LAMBETH.

H. DOULTON & CO.
High Street, Lambeth,

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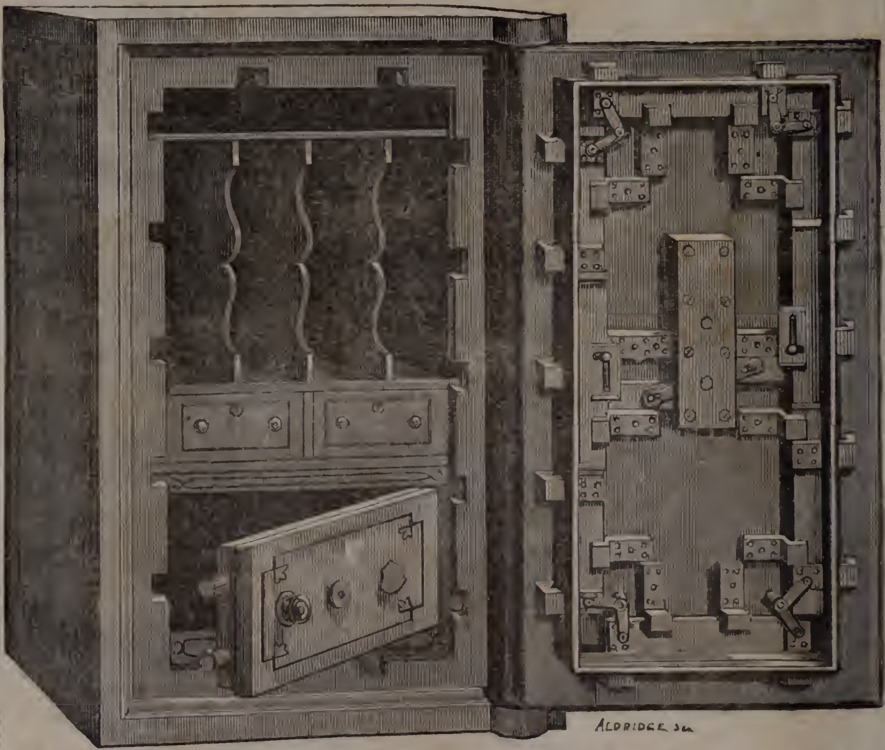

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